WINTER 1993/94

SERVICE FOR THE INTIMATE DINNER

ROTUNDA

the magazine of the Royal Ontario Museum

WILLIAM LOGAN

CANADA'S GEOLOGY MAPPED

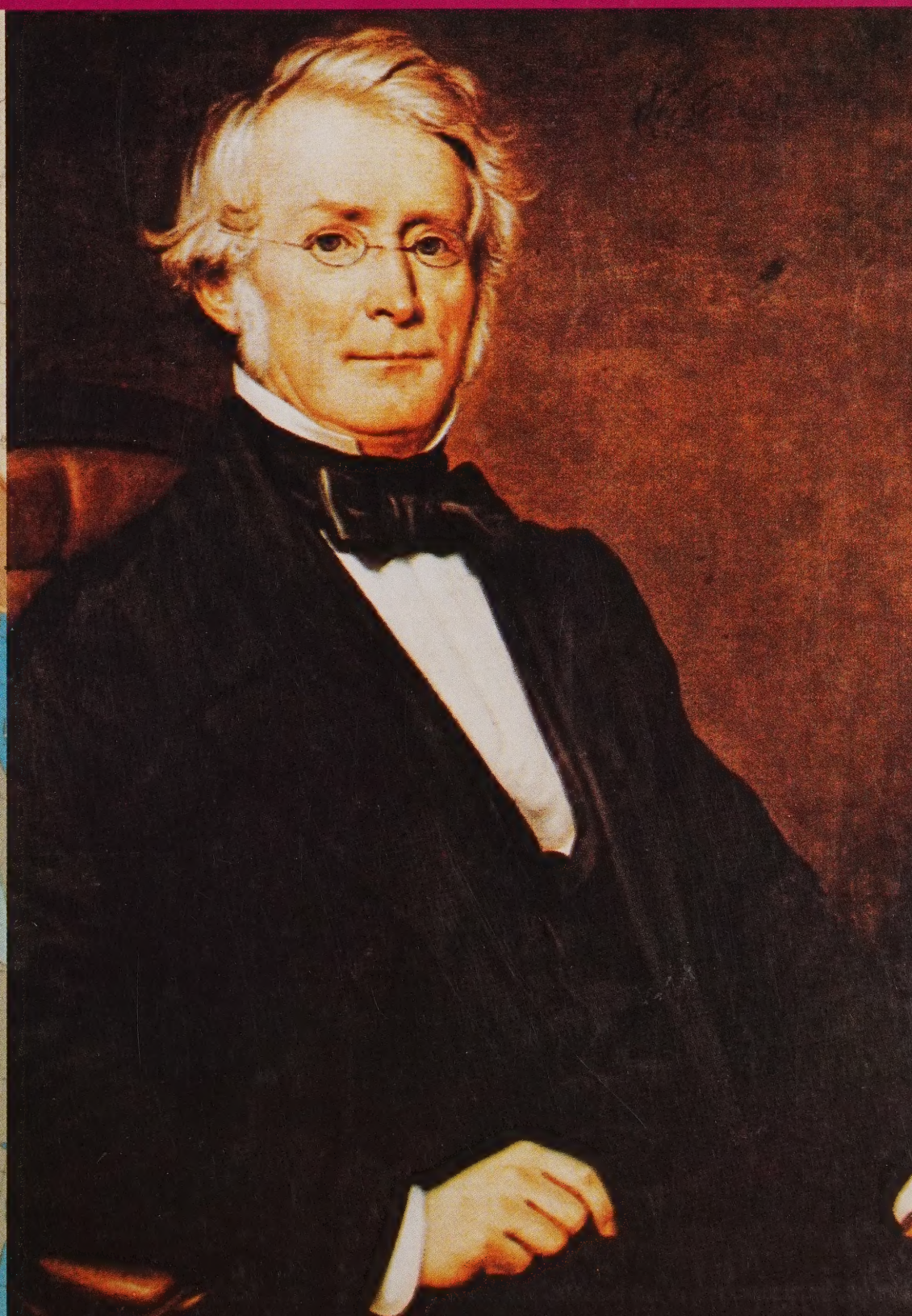
YEMEN

DANCING WITH THE ENVIRONMENT

JURASSIC ORIGINALS

CHAMPAGNE'S BONA FIDE BUBBLES

BORNEO'S SARAWAK MUSEUM



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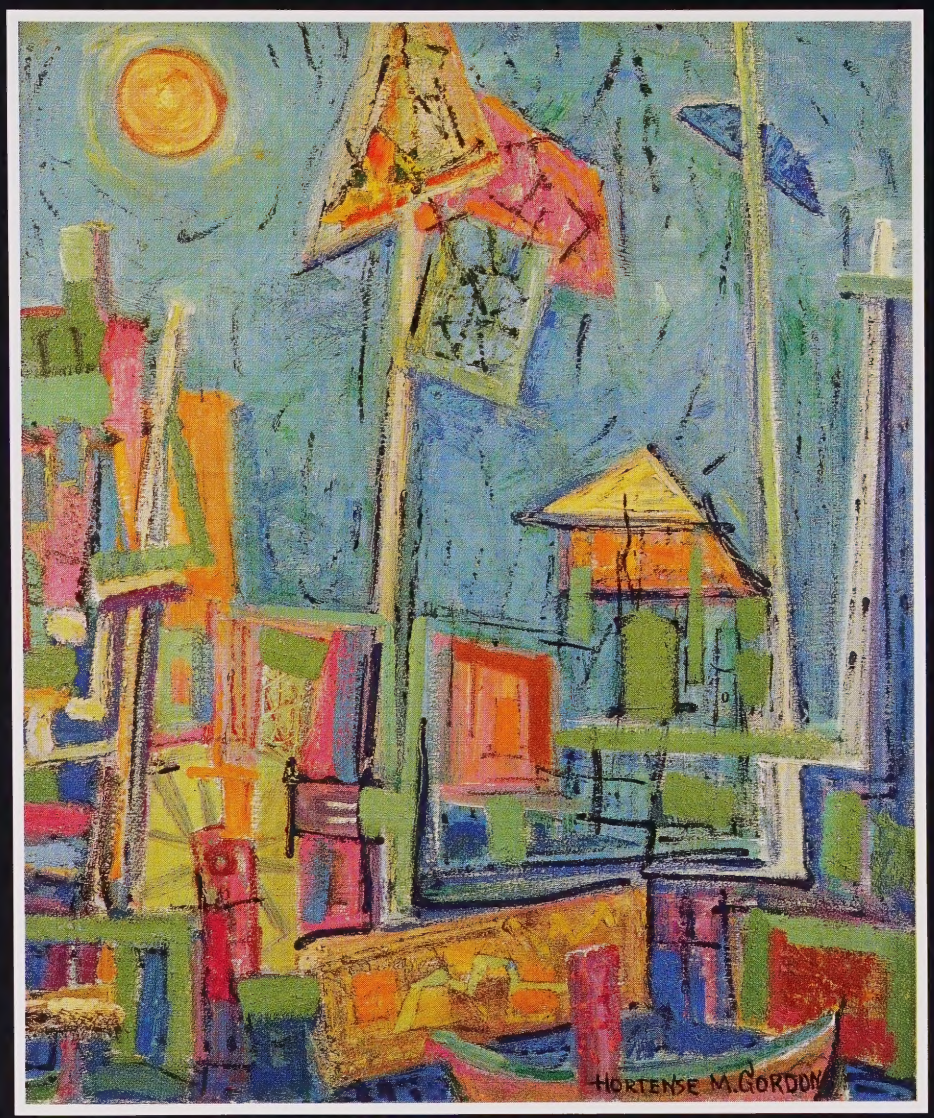

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the magazine of the Royal Ontario Museum

Volume 26, Number 3, Winter 1993/94
Date of Issue: November 1993

6
FOOD AND CULTURE
Bona Fide Bubbles

11
GROWING COLLECTIONS

41
MUSEUM NOTES
The Sarawak Museum

43
ROM ANSWERS

48
LOOK AGAIN
Don't Bug Me

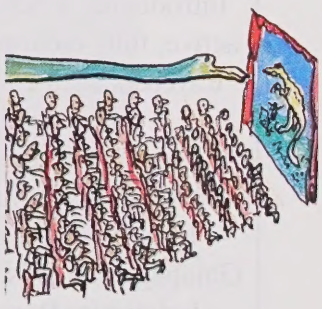
45
BOOK REVIEWS
- *The Dinosaur Project*
- *Algonquin: The Park and Its People*
- *The Explorer's Guide to Algonquin Park*
- *Lost Kingdoms of the Maya*
- *The Planters of the English Landscape Garden: Botany, Trees and the Georgics*
- *Old Order Amish: The Enduring Way of Life*
- *The Amish and the State*
- *Historic Fort York 1793-1993*
- *Travellers to an Antique Land*

14
SERVICE FOR THE INTIMATE DINNER
Christopher Hartop
The 18th-century debut of the intimate dinner party created the need for a new array of silver wares

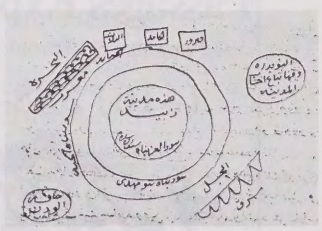
21
THE ORIGINALS
Hans-Dieter Sues
While few of the dinosaurs that inspired Crichton and Spielberg's Jurassic Park lived in Jurassic times, they did exist. What were they really like?

27
MAPPING CANADA GEOLOGICALLY
Peter H. von Bitter
The changing political and economic climate of the mid 1800s set the stage for Sir William Logan to begin his outstanding geological survey of the Province of Canada

34
DANCING WITH THE ENVIRONMENT
Ann Walmsley
Were medieval irrigation methods more effective than modern ones in Yemen?



21



34

Cover
The portrait of Sir William Logan, first director of the Geological Survey of Canada, was painted by George Theodore Berthon and hangs in the Royal Canadian Institute, Toronto. To learn about William Logan turn to page 27.
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Editor's Note

I first became aware of the Geological Survey of Canada about 12 years ago while taking a flight between Toronto and Edmonton. It was an absolutely cloudless day and as I looked out the window to see the vast gridwork of monotonous prairie farmlands punctuated only by an occasional small lake or river, I became aware of a conversation taking place between the passengers in the seats behind me. Unlike myself, they, with much excitement and enthusiasm, were noting landmark after landmark. I couldn't help eavesdropping. As someone who is well known for her ability to get lost walking around a block, I was absolutely engrossed by their words. At the end of the flight, while we all waited to disembark, I turned and asked who they were. They were from the Geological Survey of Canada.

The founder of the Survey, Sir William Logan, is the subject of the cover story in this issue of *Rotunda*. Logan, a Canadian, was appointed chief geologist of the Province of Canada in 1842. Over the next quarter century, Logan and his colleagues surveyed and mapped the country's geological makeup, identifying deposits of such valuable resources as coal, iron, and limestone. Peter von Bitter, a curator in the ROM's Department of Invertebrate Palaeontology, describes Logan's work, which culminated in the publication of a large hand-coloured map that includes the Province of Canada, the British Provinces, and the United States, at the astonishing scale of 25 miles to the inch (approx. 40 km to 2.5 cm).

The second of three feature stories about Museum research on the environment focuses on ROM archaeologist Ed Keall's work in Yemen. Keall discussed with journalist Ann Walmsley his archaeological team's discoveries related to the ancient irrigation methods once used by the population of Zabid and the modern methods used today. In the past, the region probably supported a population considerably larger than today's, and the archaeologists speculate that Zabid's future may depend upon the replacement of the current technology with a system based on ancient techniques.

I am probably biased from working in a museum, but as much as I loved reading Michael Crichton's *Jurassic Park*, I still prefer learning the latest scientific facts about dinosaurs. Crichton's book, and Steven Spielberg's film adaptation, have helped to fuell the ongoing dinosaur craze. In his article, Hans-Dieter Sues, the Museum's dinosaur expert, provides the facts behind the fiction.

It may surprise you to learn that dining in an intimate gathering is a custom that only began about 250 years ago, in the court of Louis XV of France. Writer Christopher Hartop of Christie's, New York, explains in his feature that a whole new approach to tableware emerged to service the new style of dining. For example, a covered silver tureen was specially designed to serve a chicken and pigeon casserole called *oille*. A recipe for the hardy casserole is included in the article. Perhaps a modified version will inspire you, your friends, and family to dine together in equally festive style and engage in lively conversation about this issue of *Rotunda*. May you have a happy and healthy holiday.

Sandra Shaul

SANDRA SHAUL

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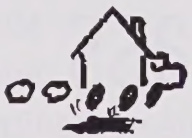

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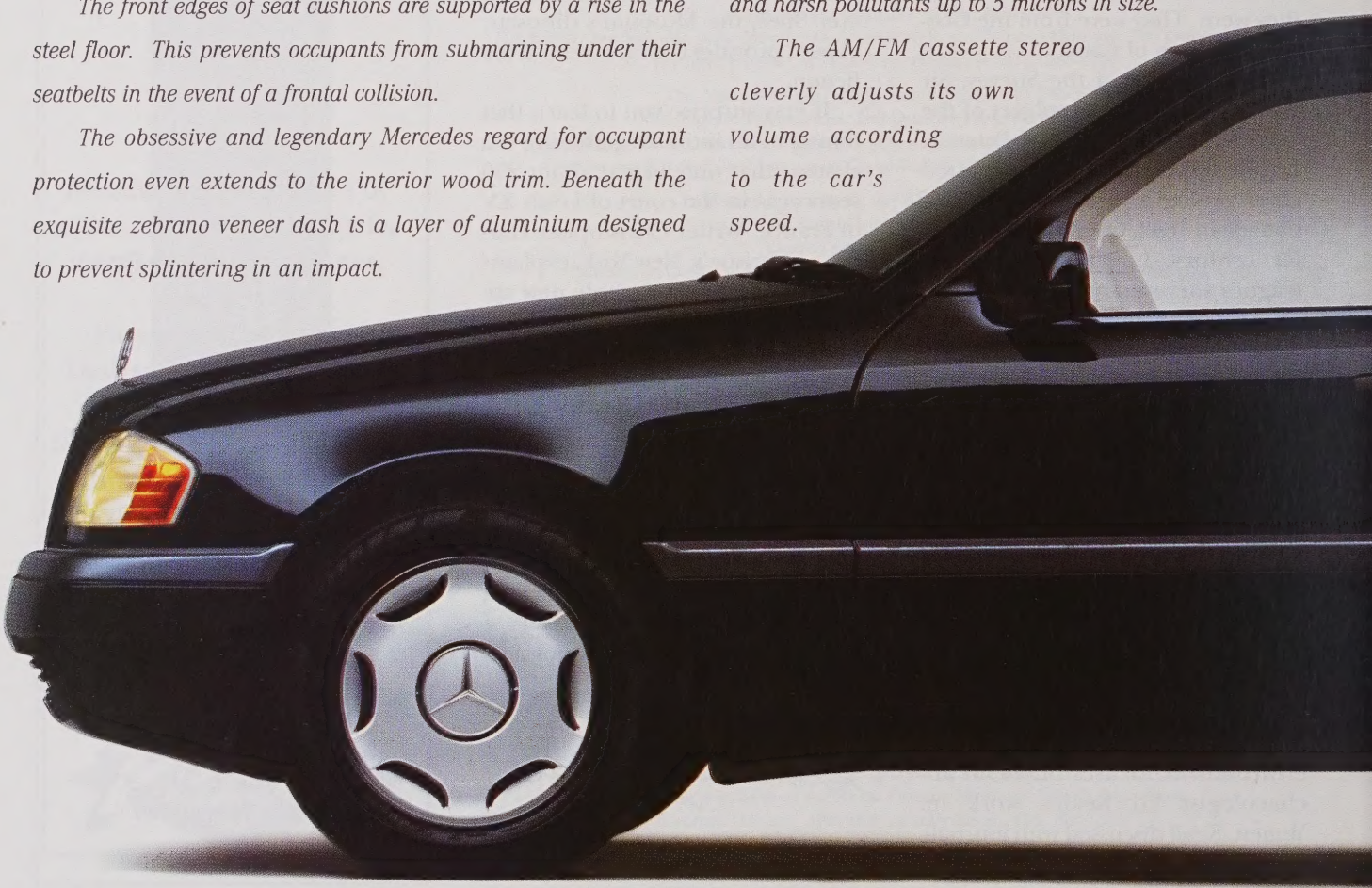

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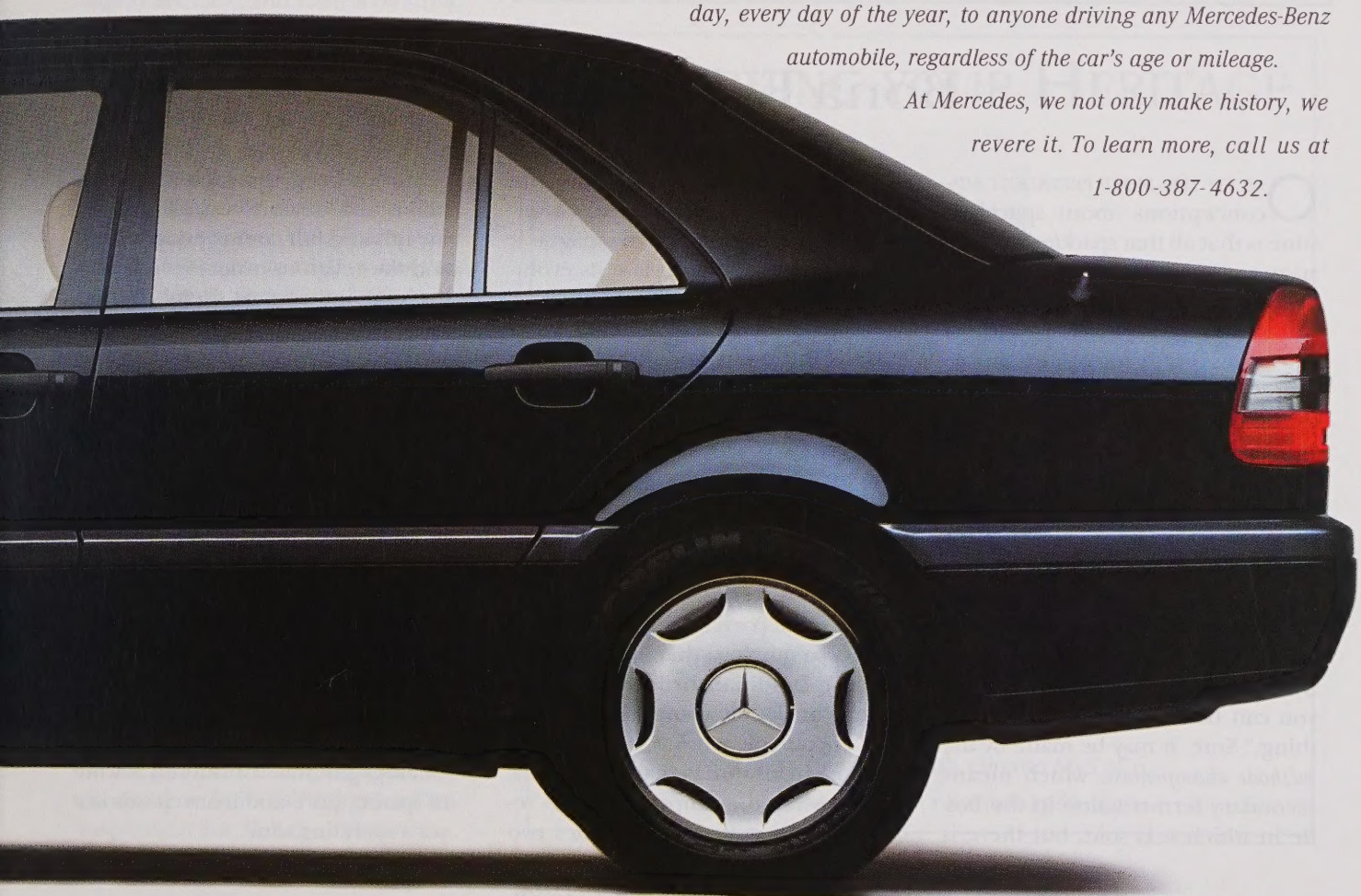

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Madame de Pompadour reputedly described champagne as the only wine that leaves a woman beautiful after drinking it.

Bona Fide Bubbles

ONE OF THE MOST PREVALENT MISconceptions about sparkling wine is that all that sparkles is champagne. Not so. Champagne is a French product that achieves its special identity from the soil in which the vines are grown, the noble grape varieties used, and the geographical position of the ancient province of Champagne where the wine has always been produced. Other countries should be ashamed of usurping a historical name for the express purpose of financial gain. When you come upon a sparkling wine labelled "Champagne" that is not from the region by that name in northern France, you can be sure it is not "the real thing." Sure, it may be made by the *méthode champenoise*, which means secondary fermentation in the bottle in which it is sold, but there is more to champagne than this simple mechanical manoeuvre. To understand the glory of champagne it is necessary to appreciate its evolution over more than 16 centuries.

The first wine-producing vineyards in Champagne appeared between the 3rd and 5th centuries and it was during this period that the first chalk cellars, still used today by some of the champagne houses, were dug out in order to extract the stone necessary to build the important city of Durocortorum, now known as Reims. Caesar's legions were quite partial to the fruit of the vine, so much so that in AD 92 Emperor Domitian ordered all vineyards in Gaul uprooted, in an effort to encourage sobriety, and replanted the fields with cereal crops. However, when the Emperor Probus restored the cultivation of vines two centuries later, the region around Reims and Chalons was planted. In the 5th and 6th centuries the clergy and the religious orders established the wine industry. St. Remi, Bishop of Reims, brought fame to the vineyards of Champagne by performing miracles that involved wine. Many great abbeys were founded at this time and the monks extended the vine-growing area in order to meet both their own requirements and those of the travellers to whom the monasteries extended hospitality at a time when inns did not exist. They also sold wine to local lords and townspeople to raise the funds required for the maintenance of their abbeys and to support charitable activities. At this time the wine of Champagne was considered a wine of quality, pure and fruity; it was not yet a sparkling wine.

The custom of crowning the kings of France at Reims, starting with Charlemagne's son Louis the Pious in 816, helped to spread the fame of Champagne's wines throughout the country, and expansion of the industry continued. Wine was shipped along the Marne River to Paris and Normandy, and by sea to Flanders, the Netherlands, and England. New roads were built to provide access to the celebrated fairs of Champagne, some lasting up to 49 days, where copious quantities of wine were consumed by visitors. Champagne's reputation spread far and wide, vineyards flourished, and vignerons prospered. Then, disaster struck in the form of the Hundred Years War; vines were abandoned and wine presses wrecked. But after Joan of Arc saw Charles VII crowned at Reims in 1429, the English and Burgundians left Champagne for good and the growth of the wine industry continued at a steady pace. A description published in 1554 stated that "the wines of Ay [one of the most famous of the Champagne villages] are clear and tawny-coloured, subtle, delicate, and of a highly agreeable taste to the palate; for these reasons, they are wines to be drunk by kings, princes, and great lords." Still a luxury product and still not sparkling.

By the middle of the 17th century the wine growers of Champagne had learned how to make wines that would travel and keep well. With great care and precaution they were also able to produce a white wine from black as well as from white grapes. They also discovered that wine bottled at the end of winter would ferment a second time as soon as the weather began to warm up. Realizing that the effervescence of what was called *vin diable* was of peculiar interest to many, winemakers decided to exploit this natural tendency to sparkle. Dom Perignon, a Benedictine monk who served as cellarer at the Abbey of Hautvillers from 1668 to 1715, is considered to be the pioneer in bringing sparkling champagne to its full splendour, an inspiration for Voltaire, who wrote,

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"This wine where sparkling bubbles dance, reflects the brilliant soul of France."

Dom Perignon did not invent champagne; rather his genius lay in discovering the five main elements that constitute the secret of champagne: the bringing together of grapes and wines from different vineyards to blend into a single harmonious cuvée; the rapid, separate pressings of the black grapes to obtain a crystal-clear white juice; the use of the first strong glass bottles; the use of corks from Spain, held in place by string to contain the effervescence; and the excavation of deep chalk cellars to ensure the ageing of the wine at a constant temperature, which also helps to prevent bottles from bursting. In addition, Dom Perignon greatly improved standards of selection and cultivation of the champagne vines. Years of experience and untiring work gave future winemakers techniques that are still used today, 300 hundred years later.

The 18th century saw the creation of many of the well-known champagne houses such as Moet & Chandon, Roederer, Taittinger, and Veuve Clicquot Ponsardin. However, the oldest establishment on record was started in 1584 when Pierre Gosset, mayor of Ay, started to sell his wines. A royal enactment in May 1728, which authorized the shipment of champagne in carriers containing between 50 and 100 bottles, opened up the world markets from Russia to America. Although bottles were specially strengthened in order to allow them to support the pressure of the gas that forms during the secondary fermentation, there were still many breakages, sometimes affecting more than one-third of the bottles stored in a cellar. More setbacks occurred as the Napoleonic Wars once again made Champagne a battlefield. And always there was the cold weather of this northernmost vine-growing region with which to contend; some years the vines suffered greatly from frost damage. Worst of all, the 19th century ended with the terrible phylloxera crisis that devastated nearly all the existing vineyards. Despite these adversities, considerable progress was made in improving the quality of the world's favourite drink of celebration.

The most significant result of the phylloxera epidemic was that the replanting of vineyards took place on the chalky slopes that produced the best wine. Technical advances such as bottle fillers and corking machines speeded up the production process. Annual sales rose from a few hundred thousand bottles to more than six million. Then the Great War began and the region once more became a battlefield; bombs, poison gas, and trenches caused devastation in the vineyards. After five years of simply surviving, the wine growers courageously began to reorganize. Great improvements were made in viticultural practices and a cooperative movement developed among the growers. A law dated 22 July 1927 laid down the limits of the vine-growing area of Champagne so that wine suitably processed from grapes grown in this area would be entitled to the appellation "Champagne."

Real champagne is, however, much more than a historical product. Madame de Pompadour is reputed to have described it so: "Champagne is the only wine that leaves a woman beautiful after drinking it." What is it about this wine that bewitches both women and men? Certainly champagne appeals to all the senses: the sight of the tiny bubbles bursting forth in a tall glass of golden liquid; a bouquet of flowers and fruit; a taste that is delicious yet light, lively, and elegant; the sounds of happiness and pleasure that fill the room.

To appreciate this form of potable history to its utmost, never, ever, pop the cork out with a loud explosion, spraying foam all over the floor. The bubbles have been created inside the bottle with great care and expense; they should not be wasted in the air or in gaping saucer-shaped glasses. A clear crystal flute

will enhance the brilliant colour and allow the mousse (bubbles) to burst forth like tiny shooting stars.

Champagne goes well with almost any kind of food at any time of day. Perhaps my most memorable champagne experience occurred at breakfast where Krug Grande Cuvée accompanied lightly smoked Scottish salmon and beautiful bulbous Beluga caviar. Champagne is an exhilarating aperitif with little seafood hors d'oeuvres; it is perfect with oysters and a natural with poached salmon. And a warm sabayon served over fresh figs, raspberries, and peaches is a sensation with Veuve Clicquot's La Grande Dame. However, one of Champagne's legendary female figures (and there were many), Madame Lily Bollinger, expressed how to enjoy her own product best: "I drink it when I'm happy and when I'm sad. Sometimes I drink it when I'm alone. When I have company I consider it obligatory. I trifle with it if I'm not hungry and drink it when I am. Otherwise, I never touch it—unless I'm thirsty."

You can serve the following delicious appetizer with champagne.

Ham and Cheese Toasts

Ingredients

- 225 g (1/2 lb) ham, finely diced
- 225 g (1/2 lb) gruyère cheese, finely diced
- 125 ml (1/2 cup) blanched, sliced almonds
- Béchamel sauce (see recipe below)
- salt and pepper to taste
- 8 large slices of bread

Method

Make the Béchamel sauce. Toast the almonds until they are light brown and mix them in a bowl with the ham and cheese. Season with a little salt and plenty of pepper. Add enough Béchamel sauce to bind the mixture. Do not add too much sauce; the mixture must remain quite stiff or it will run over when baked.

Toast the bread lightly and remove the crusts. Spread the ham and cheese mixture over the bread and bake in a hot oven (450° F) for five minutes, until it is brown and bubbling. Cut the slices of toast into bite-sized squares or triangles and serve.

Béchamel Sauce

Ingredients

- 30 ml (2 tbsp) butter
- 30 ml (2 tbsp) flour
- 125 ml (1/2 cup) dry white wine
- 125 ml (1/2 cup) chicken stock

Method

Melt butter in a small pot and stir in flour. Cook gently for two or three minutes. Add the hot stock and wine all at once, beating with a wire whisk until the sauce is smooth. Cook the sauce over very low heat for 10 minutes or so, stirring occasionally.

GERALDINE RUBINO
Geraldine Rubino is a food and wine writer living in Toronto, Ontario

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In the spring issue of *Rotunda*...

Preserving Asia's Temples

BY JAN FONTEIN

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The ROM's Chinese glass collection was recently enhanced by the acquisition of a carved-overlay glass vase

A Chinese Carved-Overlay Glass Vase Enhances the Far Eastern Collections

Because of a much-appreciated grant from the ROM Reproductions Association Acquisition Fund, the Far Eastern Department was able to purchase this small 19th-century Chinese vase of carved overlay glass. Only 11.3 centimetres high, the vase consists of a basic form of clear, white-flecked glass overlaid with transparent pink and deep plum layers. The carving through the pink and plum layers to the white-flecked base is exquisite.

The rim, foot, and main decorated area are purple, while the middle layer, representing the branchwork and blossoms of the flowering plum, is pale pink. On one side of the vase two gibbons swing by their long arms from branches of plum and pine. On the other side of the vase there is more plum, pine, and bamboo, and a spider that hangs from a long fine straight thread extending from a web.

In Chinese the word for spider is a homonym for the word for happiness. The gibbons refer to an idiom for the famed three-part Chinese civil-service examinations, which with luck would lead to success in public life. The design forms a visual pun with joyous and congratulatory meanings. This is but one example of punning in Chinese art. Pine, plum, and bamboo are called the Three Friends of Winter— green, unbroken, and, in the case of the plum, blooming even in the snow.

This splendid small vase strengthens the Museum's collection of Chinese glass.

DORIS DOHRENWEND
Doris Dohrenwend is an associate curator in the Far Eastern Department, Royal Ontario Museum

PHOTOGRAPH BY BRIAN BOYLE

Edward Greenspan, criminal lawyer. Mr. Greenspan is wearing Neostyle frames.

Censorship.

If someone tries to stop me from doing what I want to do in order to educate or entertain myself, then I think it's a form of censorship.

In a democratic society I should be able to choose what I want to see.

I don't believe that censorship should concern itself with people's sensibilities.

If you don't want to see it, don't see it.

If you don't want to read about it, don't read about it.

If you don't want to learn about it, don't learn about it.

If it's an idea, or an impression, or a picture that offends you, ignore it.

That's what freedom is about.

As long as it doesn't constitute a criminal offense, it shouldn't be restricted.

Child pornography shouldn't be a pornography offense, it should be a criminal offense, plain and simple.

We don't need censorship laws to cover it, we have criminal laws that cover offenses relating to children.

Criminal law should not expand itself to cover images.

If we give in to groups who are offended by certain images, then there is no end to the freedoms we must surrender.

As a Jew nothing offends me more than a Zundel saying that the Holocaust did not happen. But, I believe that in a democracy good ideas will win over bad ideas. And if we prohibit a Zundel's right to express bad ideas then we may stop other people from expressing good ideas.

It's a slippery slope that I think is much too dangerous in a free society.

I believe in absolute freedom of expression. Some people don't. But that's alright. After all, everybody's entitled to their own opinion.

How I See Bleep.

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SERVICE FOR THE

The 18th-century debut of the intimate dinner party

CHRISTOPHER HARTOP

INTIMATE DINNER

created the need for a new array of silver wares

A Meal at the Prince of Conti's Townhouse, The Temple, Paris 1766, **oil on canvas by M. B. Ollivier (d.1784). Collection of the Château de Versailles.**

COURTESY AGENCE DE PHOTOGRAPHIE, MUSÉES NATIONAUX DE FRANCE

"The pleasure of the table is common to all ages, all sexes and all nations; and there is no one who would not be served à la français*"*

IT COMES AS A SURPRISE TO MOST PEOPLE TO LEARN HOW RECENTLY French *haute cuisine* acquired its magnificent reputation; certainly before the Revolution it was the splendid presentation and enormous quantity of food rather than its flavour that were famous throughout Europe. If, for example, King Louis XIV, the Sun King, requested a cup of bouillon, it would be sent to him from the far-off kitchens accompanied by a fanfare and an escort of the King's Guard. By the time it reached him it would have been stone cold.

Both the amounts and the variety of foods eaten were prodigious. Louis XIV's appetite set the tone; his physician, Fagon, recorded that even when on a diet the king consumed "four wings, four legs, and four breasts of chicken" at supper. Although an ascetic, the Chevalier d'Eon (1728-1810)could consume melon, stewed eels, carp, two chickens, rabbit, a joint of beef, tart, and a pudding at a single sitting. As one nobleman remarked on his deathbed, "This exit is the result of too many *entrées.*" In 1749 Voltaire warned his countrymen that their heavy repasts would "eventually numb the faculties of the mind."

It must not be forgotten, however, that such excesses were a luxury available only to the rich; the poor existed on much plainer fare. Voltaire tells us that "there are very few peasants who eat meat more than once a month." However, the variety of fresh produce available to a rural peasant living in a fertile area must have been great; it was the urban poor who suffered, for fresh vegetables were an expensive luxury in Paris and other cities.

"The pleasure of the table is common to all ages, all sexes and all nations; and there is no one who would not be served *à la français,*" wrote Massialot in 1739. He was referring to the custom of placing an array of covered dishes before the diners, who, once the covers had been removed, would help themselves to food or give orders to their servants. Formal banquets in the 17th and 18th centuries were often arranged with the diners seated down one side of the table, leaving the servants to jostle each other on the other side as they fought off competition for a desired dish. When not dining at formal affairs, people tended to eat privately, in the bedchamber or closet, using tables that could be folded away when not needed.

It was not until the 19th century that this kind of presentation was replaced by *service à la russe,* in which diners were offered a succession of dishes by a servant. The old-fashioned way of dining appears to have persisted longer in England than on the Continent. Prince Puckler-Muskau, a German visitor to London in the 1820s and an indefatigable snob, described a typical English dinner: "After the soup is removed, all the covers are taken off, every man helps himself to the dish before him and offers some of it to his neighbours. ...If he wishes for anything else, he must ask across the table, or send a servant for it—a very troubled custom in place of which some of the most elegant travelled gents have adopted the more convenient German and French fashion of sending the servants around with the dishes."

As is so common in matters of fashion, it was in France that another form of dining first evolved. The stiff formality practised under the Sun King gave way to more intimate, convivial dinners where the art of conversation reigned supreme.

The method of serving dinner at the court of Louis XIV had been essentially medieval: a variety of dishes—fish, fowl, sugary sweet, and tart—were served together. It is known that the king usually dined alone, in his bedchamber. The Duc d'Orléans (the future Louis XV)

COURTESY CHRISTIE'S, NEW YORK

Christopher Hartop works in the silver department of Christie's, New York

This exquisite tableware includes (clockwise from top) a Louis XV silver *pot-à-oille*, Paris, 1755, maker's mark of Etienne-Jacques Marcq, engraved with the arms of Lane; a Louis XVI silver écuelle, Paris, 1776, maker's mark of François Riel; and a Louis XV silver spice box, Marseilles, 1763.

considered himself a great gourmet, and it is perhaps to him that the move away from this private gorging to a more convivial celebration of the delights of the table can be credited.

To cope with the new servantless informality, more silverware, such as sauceboats and ragoût dishes, was placed on the dining table itself

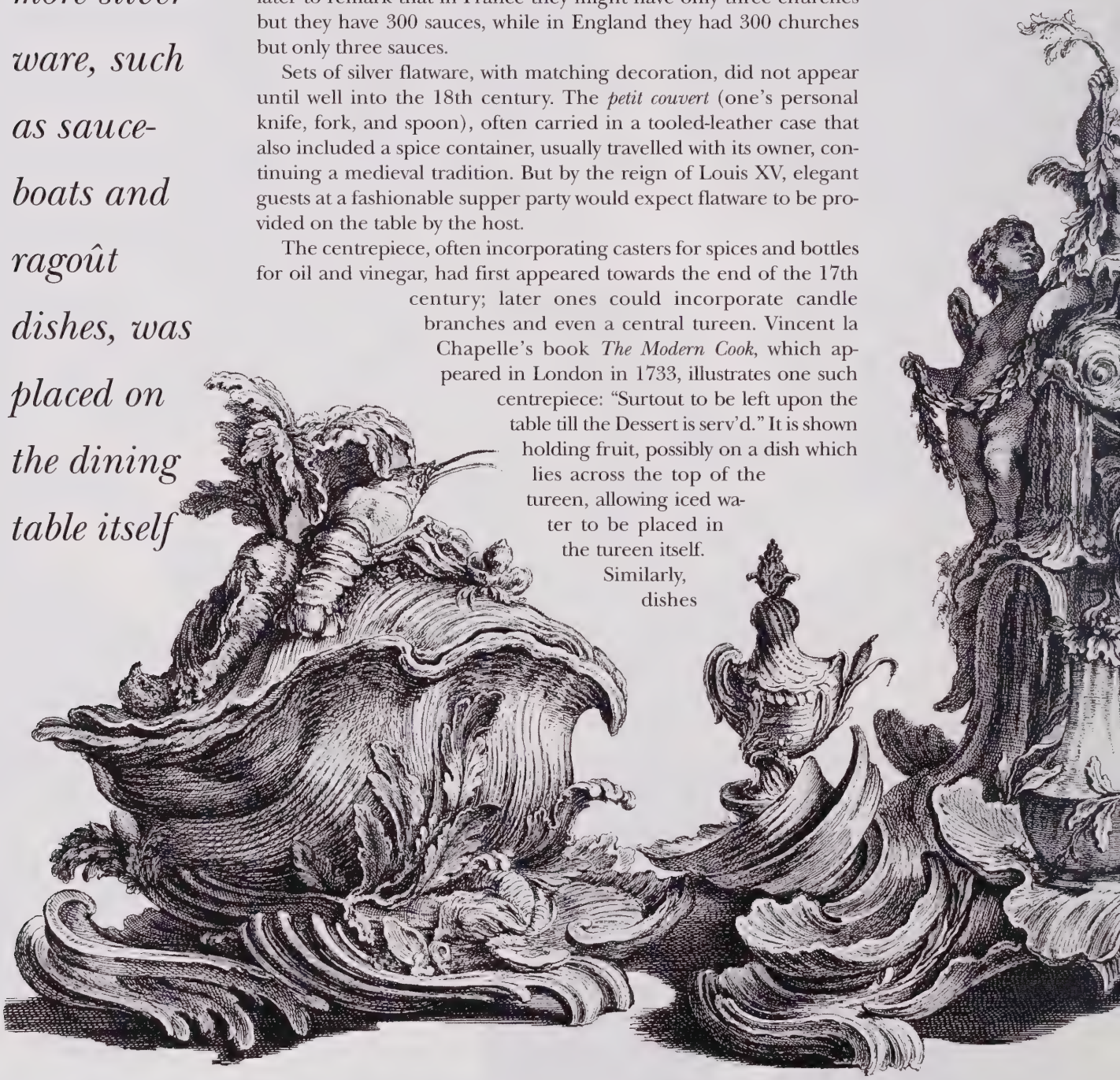
By the 1740s the supper party was all the rage. Such a dinner given by Louis XV on 30 January 1747 was described by the Duc de Croy: "We were two hours at supper, free and easy without any excess. Then the king went into a little salon where he made the coffee and poured it out. There were no servants and we helped ourselves."

To cope with this new servantless informality, more silverware was placed on the dining table itself. Objects such as tureens, ragoût dishes, cruet stands, and sauceboats appeared for the first time.

Silver sauceboats became extremely popular in the 18th century, and their form, which could accommodate one or two spouts, lent itself well to the silversmith's imaginative fancies. Sauces had become the hallmark of French cooking, prompting Talleyrand a few years later to remark that in France they might have only three churches but they have 300 sauces, while in England they had 300 churches but only three sauces.

Sets of silver flatware, with matching decoration, did not appear until well into the 18th century. The *petit couvert* (one's personal knife, fork, and spoon), often carried in a tooled-leather case that also included a spice container, usually travelled with its owner, continuing a medieval tradition. But by the reign of Louis XV, elegant guests at a fashionable supper party would expect flatware to be provided on the table by the host.

The centrepiece, often incorporating casters for spices and bottles for oil and vinegar, had first appeared towards the end of the 17th century; later ones could incorporate candle branches and even a central tureen. Vincent la Chapelle's book *The Modern Cook*, which appeared in London in 1733, illustrates one such centrepiece: "Surtout to be left upon the table till the Dessert is serv'd." It is shown holding fruit, possibly on a dish which lies across the top of the tureen, allowing iced water to be placed in the tureen itself. Similarly, dishes



could be kept warm by adding hot water to the tureen.

The earliest silver tureens with covers appear to have been called *pots-à-oille*, referring to a dish first mentioned by Madame de Sévigné in 1673. *Oille* was a rich stew of vegetables, game, poultry, and meat introduced to France from the Spanish Court. In her letters, Madame de Maintenon enthuses about an "*ouille-en-pot.*" A dish like this had to be served hot, right on the table, and so the covered tureen was born. One of the earliest such tureens to survive was made in Paris for the Bavarian Court about 1700. The term *soupière* does not appear until well into the 18th century and seems to have referred to the larger oval tureens most popular during the neo-classical period.

Perhaps the most ravishing *pots-à-oille* of all are the two made to designs by Meissonnier for the English Duke of Kingston in the 1740s. Sold in the 1970s they are now split between the Cleveland Museum of Art and the Thyssen-Bornemisza collection. As naturalistic works of sculpture they are quite breathtaking, and they must have caused quite a stir on the duke's dinner table where they formed part of an elaborate centrepiece, the rest of which is now lost.

It is significant that Meissonnier's tureens were commissioned by an Englishman, for French table silver enjoyed an unparalleled reputation throughout Europe. The royal courts of Russia, Denmark, Sweden, Portugal, and Bavaria had French table services. Yet, while most of these services made for export have survived, none exists in France. The depredations of revolution and war have taken their toll and today it is necessary to travel outside France to appreciate what it must have been like to dine at the French Court.

The last word might best be left to another French gastronomic writer, Marin, who in his *Dons de Comus* anticipated the suggestions of modern cookbook writers by some two hundred years when he claimed that for the bourgeoisie it was a simple matter to eat like princes provided they had proper, well-made pots and pans, went to the market every day, and knew how to make good bouillon.

Meissonnier designed an elaborate silver centrepiece, which included two *pots-à-oille*, for the English Duke of Kingston in the 1740s.

Oille Fit for a King

From the Middle Ages until well into the 17th century, sugar was used in great quantities both to mask the taste of bad or poorly hung meat and to give a small jolt to the nervous system of diners in the days before caffeine was consumed through tea and coffee. Spices became more plentiful in the 18th century through trade with Africa, the East, and the Caribbean. They also became accessible to the middle classes. With the greater variety of seasonings, fine cuisine could develop.

As early as 1655 Pierre-François de la Varenne, a culinary writer, advocated replacing sugar with subtler flavourings such as lemon juice. Spices would become more important for enhancing and producing good flavours than for masking bad ones.

Apart from ground pepper and cinnamon, nutmeg was the most commonly used spice. Nutmeg is at once aromatic, warm, and sweet. The poet Nicolas Boileau, in his *Ridiculous Repast*, had inveighed against nutmeg: "Do you like nutmeg? It's in everything!" The Dutch had enjoyed a nutmeg monopoly until an enterprising Frenchman with the felicitous name of Pierre Poivre succeeded in spiriting some nutmeg trees out of Dutch territory and planting them on the island of Mauritius. By 1770 the French nutmegs had reached Paris.

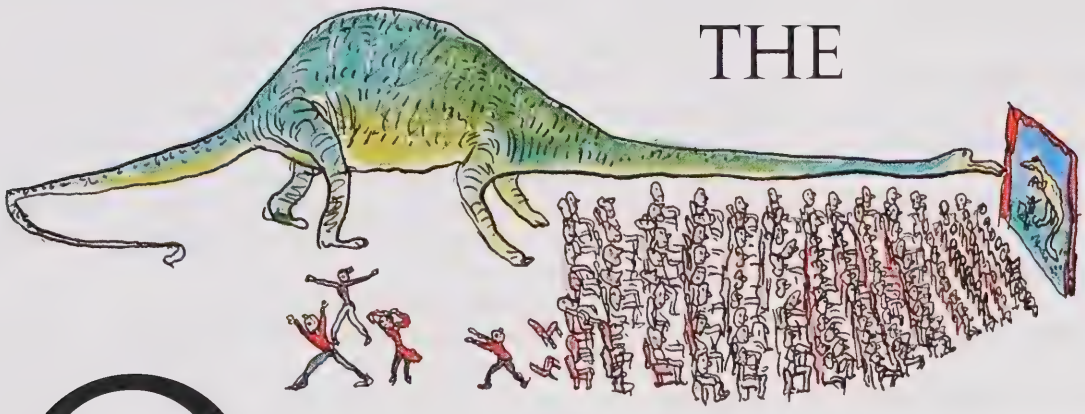
While the French held their cuisine to be unequalled anywhere in the world, visitors were often disappointed. One English traveller on the Grand Tour announced categorically that French cooking was "an abomination" and recommended that any compatriot who was forced to eat it to "get near enough the door to make his exit suddenly." Ultimately it is the French who, with justification, have been able to laugh at English cooking, but in the 18th century the quality and quantity of English meat and fish were renowned.

Should you and a group of your most intimate and hungry friends wish to dine in authentic 18th-century style, try the following recipe for *oille*.

Trim and clean a plump chicken and two big pigeons. Stuff them with a forcemeat composed of crustless bread soaked in stock blended with eight egg yolks, a white onion baked on hot coals, and three chopped artichoke hearts, the whole seasoned with a few leaves of chervil and a pinch of grated nutmeg. Sew up the three birds to keep in the forcemeat and truss them to prevent deformation in cooking. Into an earthenware pot put about three kilograms of beef cut into thin slices, a veal knuckle cut into four pieces, three onions, a parsnip, two carrots, two turnips, two white leeks, and some chard. On this foundation place the stuffed birds. First heat on a very hot coal fire, then place the pot on a moderate heat. Remove the scum from the top and continue simmering. After five hours serve the birds on a bed of toast in a large serving dish. ❦

One of the two silver tureens from the Duke of Kingston's centrepiece is in the collection of The Cleveland Museum of Art, Leonard C. Hanna, Jr., Fund.

PHOTOGRAPH COURTESY THE CLEVELAND MUSEUM OF ART



THE ORIGINALS

While few of the dinosaurs that inspired Crichton and Spielberg's Jurassic Park *lived in Jurassic times, they did exist. What were they really like?*

HANS-DIETER SUES

THANKS TO SUPERB ANIMATION SEQUENCES AND MODELS, THE DINOSAURS ARE THE real stars of Steven Spielberg's film *Jurassic Park*. The special effects have increased the public's fascination with dinosaurs by beautifully illustrating the modern vision of these mysterious creatures as dynamic, agile animals capable of complex behaviour.

Many people think of dinosaurs as the domain of children because most children seem to pass through a phase of intense curiosity about these and other prehistoric creatures. Unfortunately this intense interest has been exploited by a vast market of commercial products of questionable merit, ranging from noodles to video games. A purple dinosauroid named Barney has attracted a large following among small children but his greatest strength appears to be as a fundraiser for public television.

A number of universities offer undergraduate courses on dinosaurs as a way of teaching the basics of biology and geology to a student population increasingly illiterate in the sciences. Many recent fantasy and science-fiction books feature dinosaurs or creatures inspired by dinosaurs, making them the modern counterpart to the dragons of ancient legend and myth. The current popular obsession with dinosaurs, a veritable "dinomania," dates back to the 1970s and shows no signs of abatement.

ILLUSTRATIONS BY GAIL GELTNER

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Many people think of dinosaurs as the domain of children. Unfortunately their interest has been exploited by a vast market of commercial products. A purple dinosauroid named Barney has attracted a large following among small children

Why are people so fascinated by dinosaurs? The American child psychologist Shep White once observed that children like dinosaurs because they are "big, fierce, and extinct." These attributes also appeal to many adults. Mounted skeletons of dinosaurs (or at least high-quality casts of such specimens) now form the principal attraction of any major museum concerned with natural history. Thanks to the efforts of one of its early directors, William Arthur Parks, the Royal Ontario Museum houses one of the finest collections of dinosaurian skeletons in North America.

As an avid movie watcher and palaeontologist, I enjoyed the Spielberg film. The dinosaurs compensated for the rather uninspired human acting and predictable "monsters-versus-good-people" plot. They made the movie more than the usual "creature feature." Like my fictional counterpart, Alan Grant, I was awestruck by the sight of my favourite beasts coming back to life. Yet, as a real-life student of dinosaurs, I have some reservations about the scientific theory presented in *Jurassic Park* through Michael Crichton's screenplay and novel of the same name.

Crichton's basic premise, that dinosaurs could be cloned from preserved fragments of deoxyribonucleic acid, or DNA, is, perhaps fortunately, beyond the realm of possibility for present-day science. A team of American researchers recently extracted small fragments of DNA from a Cretaceous weevil preserved in amber, but this material represents only a minuscule amount of the original genetic information for this beetle. Like humans and other advanced multicellular organisms, dinosaurs had highly complex genetic codes involving billions of base pairs of genes. It is estimated that the human genome (genetic code) comprises some three billion base pairs, and the genome of even a simple organism consists of millions of base pairs. The DNA molecule is a delicate two-stranded structure that is extremely unlikely to survive the stresses of fossil preservation, even in minute quantities.

In Crichton's story, mosquitoes, exquisitely preserved in amber from the Dominican Republic, contain traces of dinosaurian blood and thus provide the necessary DNA for cloning dinosaurs. As Dominican amber dates back only about 40 million years, it postdates the last of the dinosaurs (other than their descendants, birds) by some 25 million years. Amber from the Age of Dinosaurs occurs in western Canada, Lebanon, and a few other regions; however, no Mesozoic insects feeding on dinosaurian blood have been definitely identified from this or any other source.

Crichton also took poetic licence in his choice of dinosaurs. Most of them lived during the Late Cretaceous (about 80 to 65 million years ago), a vastly different period in geological time from the Jurassic. The only truly Jurassic "characters" are the gigantic *Brachiosaurus* from the Late Jurassic (145 million years ago) and the crested *Dilophosaurus* from the Early Jurassic (about 190 million years ago).

The biggest star of *Jurassic Park* is the wonderfully named *Tyrannosaurus rex* (tyrant king lizard). Up to 15 metres in length and seven tonnes in weight, it was the largest land-dwelling carnivore that ever lived. Some have considered it a scavenger, but the skeletal structure of *T. rex* clearly establishes this dinosaur as an active predator. Its massively constructed skull, which could be 1.5 metres long, held huge, deeply rooted teeth with crowns as long as 15 centimetres and serrated cutting edges. *T. rex* walked on powerful legs with three-toed, bird-like feet. Recent biomechanical inferences suggest that it may have moved at speeds as high as 20 kilometres per hour. (Higher speeds implied by the film's spectacular car chase are greatly exaggerated.) Although tyrannosaur arms were much shorter than the legs, they were strongly built. In fact, an arm of a large *T. rex* would have been the same length as that of an average human male; however, recent studies indicate

that the animal was capable of lifting several hundred kilograms. In the movie, *Tyrannosaurus* and the other predatory dinosaurs have an ostrich-like posture. This stance replaces the incorrect "kangaroo" posture featured in older reconstructions. Scientists now believe that the back of these dinosaurs was held in a virtually horizontal attitude while the neck had an S-shaped upward curvature, much like the ostrich and other large ground-dwelling birds.

In 1990 a particularly large specimen of *T. rex* was excavated by commercial collectors on Sioux Indian Nation land in South Dakota; it was subsequently confiscated by federal authorities. This skeleton, informally named "Sue" in honour of its discoverer, displays a remarkable array of serious injuries that attest to a life of violence. A bite from another tyrannosaur seriously damaged the right side of its snout, nearly obliterating the right eye-socket. This injury healed, as did damage to ribs, tail vertebrae, and limbs. Sue sustained fractures of each of its lower legs, which also healed but left huge lumps of excessive bone growth. It is difficult to imagine how a bipedal hunter could have procured prey while limping along with shattered legs. A bite to the back of the head, which destroyed much of the back of the skull, shows no signs of healing, and was probably the fatal blow to this giant predator.

Tyrannosaur arms would have been the same length as that of an average human male. Recent studies indicate that the animal was capable of lifting several hundred kilograms

Tyrannosaurs are known only from the Late Cretaceous of North America and East Asia. *Tyrannosaurus rex* and its Mongolian sister-species *T. bataar* were very large, massively built animals. Several palaeontologists have suggested that *Tyrannosaurus* specialized in preying on the huge horned ceratopsian dinosaurs, but there is no reason to assume that they did not hunt other prey as well. Other tyrannosaurs such as the Mongolian *Alioramus* and the North American *Albertosaurus* (a skeleton of which is on exhibit at the ROM) were smaller and more gracile in build and perhaps preyed on more fleet-footed prey such as duckbilled dinosaurs.

Dilophosaurus (two-crested lizard) from the Early Jurassic of Arizona is one of the earliest large dinosaurian carnivores. It is especially characterized by the presence of two tall, thin bony crests on the top of its snout (which is more elongate and tapered than the Hollywood version). In the movie, this dinosaur is also adorned with a collar-like, erectile frill, but there is no fossil evidence to support this fanciful restoration, or the way it spits venom like present-day spitting cobras. Spitting cobras have hollowed fangs with specialized discharge orifices for this purpose. Dilophosaur teeth are indistinguishable from those of other carnivorous dinosaurs. No evidence exists to indicate that any dinosaurs used oral toxins to stun or kill prey. The dilophosaur in the movie was obviously a young animal because the fossil record shows that adults exceeded six metres in length.

The film's menacing *Velociraptor* (fast robber), dubbed "raptor," is actually based on *Deinonychus* (terrible claw) from the Early Cretaceous of Montana and Wyoming, a close relative of the distinctly smaller and more delicately built namesake, which lived in the Late Cretaceous of East Asia. *Deinonychus* reached about 2.5 to three metres in length and 70 kilograms in weight. They were formidably armed predators.

The snouts of *Deinonychus* and *Velociraptor* were armed with numerous, blade-like teeth with sharp, serrated cutting edges. Unusually long hands had a highly mobile wrist and three slender fingers that ended in large claws that could seize and hold prey. The main weapon of *Deinonychus* and its kin, however, was a greatly enlarged, sickle-shaped claw on the second digit of the foot. This talon was presumably used to deliver lethal slashing kicks to vulnerable parts of intended prey. In order to employ the formidable claws, *Deinonychus* had to attack by balancing on one foot or by leaping while delivering power-

ful backward strokes with the legs. The present-day cassowary, a relative of the ostrich, uses a large claw on the inner (second) toe in self-defence. A slash with this spur can easily disembowel or sever a limb of an attacker.

One of the most peculiar features of *Deinonychus* and its kin is the tail. Except near its base, the rather long tail is completely encased in bundles of delicate, parallel rods of bones, extensions of the bony processes known as zygapophyses, which link individual tail vertebrae. As a result, the tail was virtually rigid except near the base. It probably served as a kind of balancing pole to stabilize the animal when it used its feet to attack prey or when it abruptly changed direction while running.

From an evolutionary perspective, birds are feathered dinosaurs. In recent years, bird-like theropod dinosaurs and very reptile-like birds have been described in Cretaceous strata

Yale palaeontologist John Ostrom found excellently preserved skeletal remains of several individuals of *Deinonychus* together with bones of the much larger herbivore *Tenontosaurus,* an animal that could weigh 600 kilograms. On the basis of this find, he has argued that *Deinonychus* may have hunted in packs, and some may have died in the effort. Broken and shed teeth of *Deinonychus* and its relatives are often found with the bones of larger herbivorous dinosaurs. Although much smaller than *Tyrannosaurus, Deinonychus* and its relatives were fearsome hunters capable of bringing down much larger dinosaurs.

Direct evidence of the hunters' predatory habits comes from an extraordinary Late Cretaceous fossil find from the southern Gobi Desert, now on exhibit in Ulan Bator. The exhibit shows two dinosaur skeletons entwined in a life-and-death struggle. The skull of a *Protoceratops* is in the grasp of a *Velociraptor,* whose slashing talons are fixed in the abdominal region of the small plant-eating dinosaur. Prey and predator were apparently overcome in mid-battle by a sandstorm.

In the late 1960s, the unusual anatomical features of *Deinonychus* led Ostrom and Robert T. Bakker, then a Yale undergraduate, to advance new ideas that have dramatically changed thinking about dinosaurian biology. *Deinonychus* was clearly a very active, agile animal that defied the traditional interpretation of dinosaurs as dim-witted, overgrown reptiles.

After completing his study on *Deinonychus,* Ostrom commenced research on pterosaurs. While reviewing European collections of Jurassic pterosaurian skeletons from the lithographic limestones of Bavaria, he realized that one pterodactyl specimen housed in a Dutch museum was, in fact, an incomplete skeleton of one of the most famous fossils—*Archaeopteryx*—the earliest known bird. Ostrom's examination of all the skeletons of *Archaeopteryx* available at that time brought to light scores of striking similarities between this bird and *Deinonychus* in virtually every part of the skeleton. It allowed him to build a convincing case to support the idea, dating back to the work of the eminent Victorian Thomas Henry Huxley, that birds evolved from small carnivorous dinosaurs. From an evolutionary perspective, birds are feathered dinosaurs. In recent years, a number of very bird-like theropod dinosaurs and very reptile-like birds have been described in Cretaceous strata of East Asia and North and South America. Some of these dinosaurs have been initially misidentified as primitive birds and vice versa.

In terms of species diversity, birds are an enormously diversified group that continues the reign of dinosaurs to this day. There are more than 9000 described species of birds compared to only about 4000 known species of mammals.

The fascination with dinosaurs will endure. Dinosaurs will always be with us—as fossils on display in museums and as birds, their descendants, singing in the trees. The size and striking appearance of the fossil skeletons will forever inspire wonder and dreams. Far from being evolutionary failures, and even without the help of Michael Crichton and Steven Spielberg, dinosaurs are one of the most successful groups of land-dwelling animals ever to populate this planet. ❦

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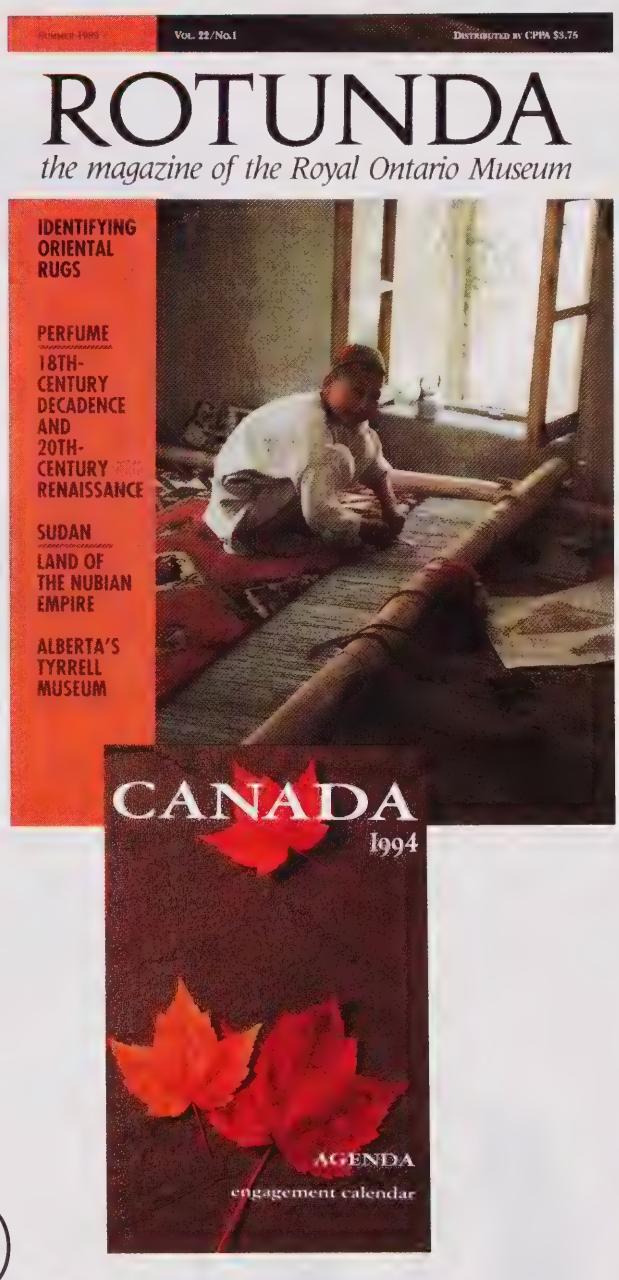

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Fred Lehner

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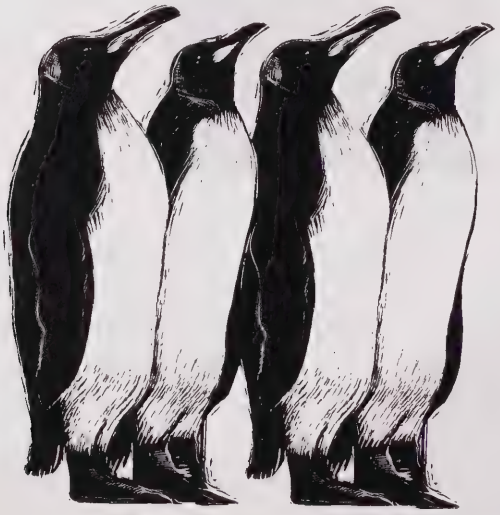

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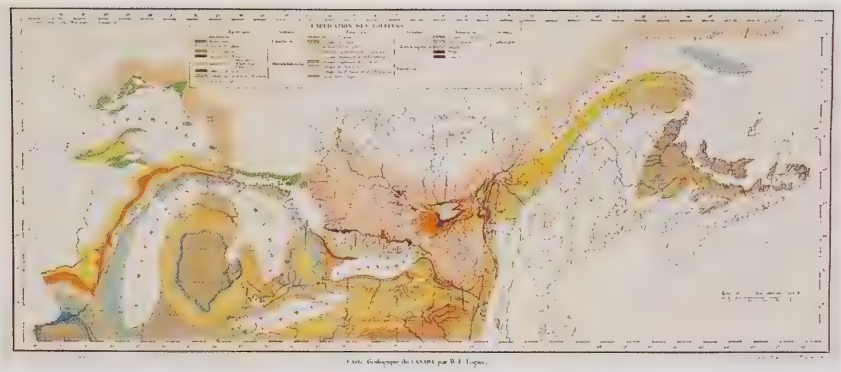
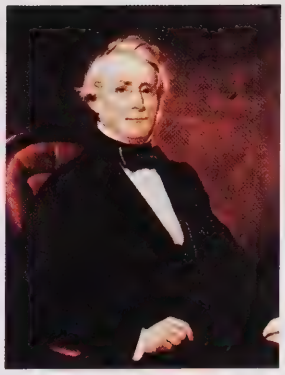




LOGAN PORTRAIT COURTESY OF THE GEOLOGICAL SURVEY OF CANADA
MAP PHOTOGRAPH COURTESY OF THE METROPOLITAN TORONTO REFERENCE LIBRARY

MAPPING CANADA GEOLOGICALLY

The changing political and economic climate of the mid 1800s set the stage for Sir William Logan to begin his outstanding geological survey of the Province of Canada

PETER H. VON BITTER

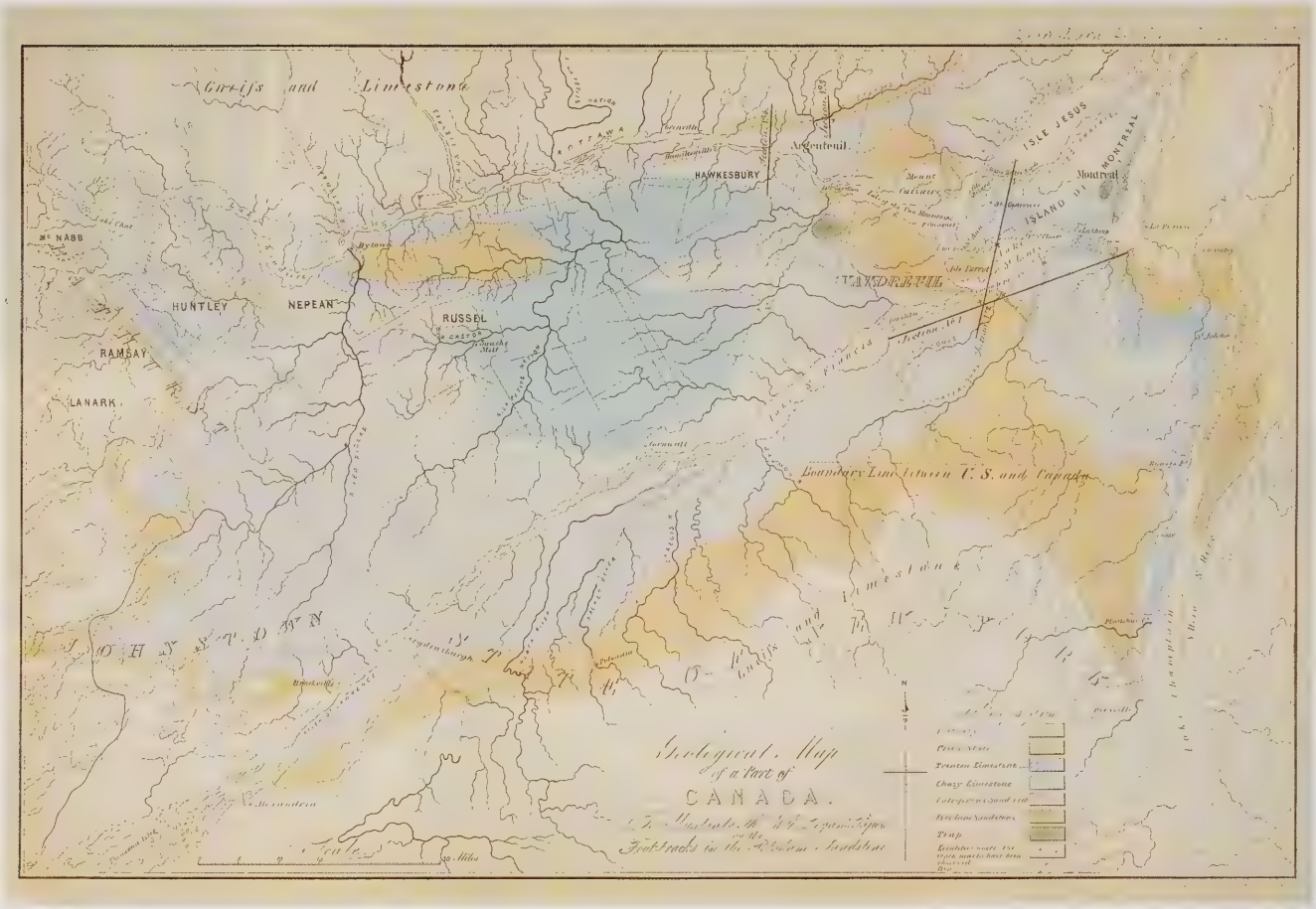
JULIA MATTHEWS, THE HEAD LIBRARIAN OF the Royal Ontario Museum, has a natural interest in just about everything and a gift for drawing people out. Last year, in a casual conversation, I mentioned to her that it was the 150th anniversary of the founding of the Geological Survey of Canada by William Logan, an event that holds special significance for me because of my geological background and my interest in early Canadian geological mapping. Geological mapping is the process of recording on a map the distribution and relationship of different rock types and the location of important resources like coal, iron, and limestone.

A few days later, Julia called and suggested that I might wish to stop by the library. I was stunned when she brought out a copy of Logan's large geological map of Canada, a 253 cm x 105 cm hand-coloured rarity printed in 1869. How Logan came to create this remarkable map is a story that combines Canadian political and economic history, scientific research, and changing technology with singleminded perseverance and dedication.

William Edmond Logan, born in Montreal in 1798, laid the groundwork for the Geological Survey of Canada with his geological maps of the Province of Canada and the surrounding regions. Logan had left Montreal in 1814 for Scotland to study in Edinburgh, returning to Canada only occasionally for visits. Appointed provincial geologist in April 1842, he returned to Canada from Britain in 1843 to commence field work. He came back to a country whose political and economic climate had changed profoundly during the almost 30 years that he had lived abroad. Decades of political and economic tension between the British North American colonies and the United States had, two years before his departure, culminated in the War of 1812. By the end of the war there were clearer definitions of the political and economic boundaries between the colonies to the north and the vigorous, assertive country to the south.

The two British colonies of Upper and Lower Canada, today's southern Ontario and southern Quebec, prospered after the

Peter H. von Bitter is a curator in the Department of Invertebrate Palaeontology, Royal Ontario Museum



Above: Published in 1852 in London, Logan's first geological map of Canada is centred on today's eastern Ontario and western Quebec.

Facing page: Showing part of what is now southern Ontario and Michigan, this map published in Toronto in 1854 accompanied a report documenting the absence of coal in "Western Canada."

Preceding page: Logan's geological map of the Province of Canada, printed by chromolithography in Paris in 1855, was based on a hand-coloured original first publicly displayed in 1851. The portrait of Sir William Logan, first director of the Geological Survey of Canada, was painted by George Theodore Berthon and hangs in the Royal Canadian Institute, Toronto.

war because of increases in the timber trade, ship-building, and immigration. However, after a period of affluence a more turbulent time resulted in the short-lived rebellions of 1837 and 1838. Lord Durham, appointed high commissioner and governor general of Canada after the rebellions, submitted in 1839 the Report on the Affairs of British North America, recommending that the two colonies unite and that the new province have control over its own affairs.

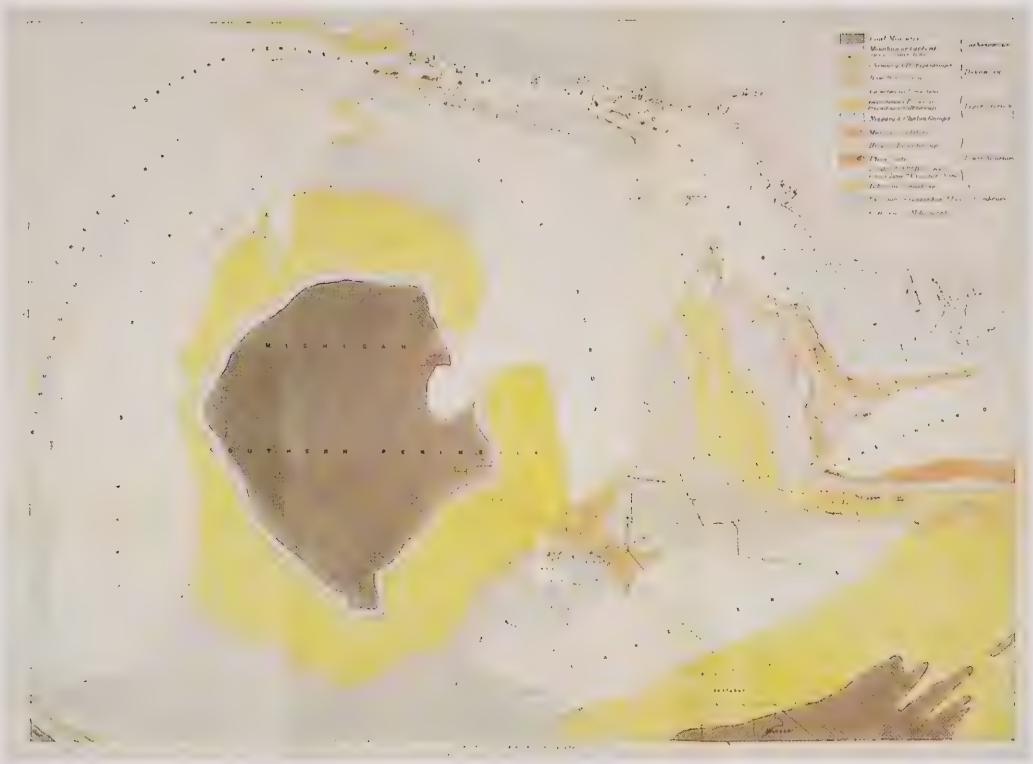
The union of the two colonies, in 1841, into the Province of Canada was important both for the field of Canadian geology in general and for William Logan in particular. It overcame the inertia that had, in the 1830s, defeated several proposals for a geological survey. There was a growing interest in connecting the province by railroads, which required coal to operate, and in the establishment of a manufacturing base, which needed raw materials like iron and limestone. This undoubtedly helped to loosen the government purse-strings for financing a geological survey when, as one of its first acts, the new Legislature of the Province of Canada considered a petition by two learned societies in Montreal and Quebec and passed a resolution setting aside £1500.

William Logan's appointment as provincial geologist was a logical one. Not only was he highly recommended by the British geological establishment, but all his previous experience seemed but a preparation for his true and final destiny, to return to his native Canada as its chief geologist.

Largely self-taught, Logan had had only a single year at university, but he had gained experience in coal mining, copper smelting, accounting, and surveying. He spoke five languages and was an accomplished landscape painter. By about 1834 he was mapping parts of the South Wales coalfield at the scale of one mile to the inch. Sir Henry Thomas de la Beche, the first director of the Geological Survey of Great Britain, recognized the quality of Logan's work and incorporated most or all of it into the Geological Survey maps published for that area. It was this unique combination of experience and interests, as well as independent means and bachelorhood, that qualified Logan to take on the monumental task of surveying the geology of Canada.

When he took up his duties in Canada, Logan must have felt immediate pressure

MAP PHOTOGRAPHY BY BRIAN BOYLE



William Logan's appointment as provincial geologist was a logical one. All his previous experience seemed but a preparation for his true and final destiny

to produce a geological map of the country. His friend, the famous Scottish geologist Charles Lyell, after travelling through British North America and the United States in 1841-42, had compiled one of the first detailed geological maps of eastern and central North America. Lyell's map of 1845 was based on the ongoing work of geological colleagues in regions where geological mapping had started earlier.

Summer 1843 saw Logan conducting field work in the Gaspé Peninsula where he engaged in the search for commercial quantities of coal. Although unsuccessful in that quest, his first field season set the pattern for succeeding summers during which he, his assistant Alexander Murray, and others slowly began to gather the data for the jig-saw puzzle that is the geology of Canada.

Logan and Murray described their work as conducting "a geological survey of the province," with Logan signing himself as provincial geologist and Murray as assistant provincial geologist. However, by 1846 their reports of progress were under the more formal heading "Geological Survey of Canada." Logan, as head of the survey, freely utilized geological information obtained by his staff; thus his maps are both compilations and collective works of the Geological Survey of Canada.

By the early 1850s, there was an avalanche of new geological information on all parts of North America, with Logan as one of the contributors. In 1851 he represented Canada for the first time at a major international exposition, the Great Exhibition of London, where he introduced the public to a geological map of the new province. The French mineralogist and geologist Armand Dufrenoy expressed the hope that this map would be published soon. Whether because of a lack of time, or a need for more data, or simply because he was not ready, Logan did not immediately fulfil this hope. Instead, his first geological map of Canada, published in London in 1852, is small (29.3 cm x 19 cm) and is centred on today's eastern Ontario and western Quebec.

The hand-coloured map accompanied an article about fossil footprints and shows seven geological units recognized by Logan. A geological unit can be all the rocks of one age—for example, all sedimentary rocks of Silurian age—with the age of the rocks determined by the fossils they contain. A geological unit can also be all the rocks of a specific kind or composition, such as granite or limestone.

On his 1852 map Logan acknowledged the volcanic nature of Mount Royal in Montreal, as had his friend Lyell. He also showed the distribution of sandstones, limestones, and shales in eastern Ontario, western Quebec, and northern New York,

The 1865 *Geological Map of Canada*, dated 1864, is far superior in quality to the map printed a decade earlier in Paris. Logan considered it but an index compared to his larger map.

sedimentary rocks that he identified as Silurian in age. Most of these rocks were later placed in the Ordovician period.

The 1852 map was followed by another small (44.75 cm x 32.5 cm) geological map of part of what is now southern Ontario and Michigan, published in Toronto in 1854; it accompanied a report documenting the absence of coal in "Western Canada." (As early as 1845 Logan had been critical of the British Government's having so lightly given up "the Michigan territory" with its coal deposits.) The map was engraved by John Ellis of Toronto and was hand-coloured in delicate watercolour hues. The hand-colourers (possibly including Logan himself) were unable to meet the publication deadline and some subscribers to the *Canadian Journal* received, along with apologies from the publisher, uncoloured copies. Logan's 1854 map is the first to focus on the geology of today's southern and western Ontario. It also assigns 14 recognized geological units to six broader ages, something the 1852 map does not do.

Huronian rocks of the North Channel and the northern rim of Georgian Bay, shown as Cambrian on the map, are now considered Precambrian. The overlying rocks to the base of the Hamilton Group are shown as Silurian; today they are divided into the Ordovician and Silurian. The Michigan Basin, a remarkably symmetrical formation, is illustrated as a series of concentric rings; the Lower Carboniferous is tinted blue around a bull's eye of grey Upper Carboniferous. Logan applied the British rather than American terms—the Mountain Limestone and the Coal Measures—for these rocks.

And what of Armand Dufrenoy's hope of the publication of Logan's geological

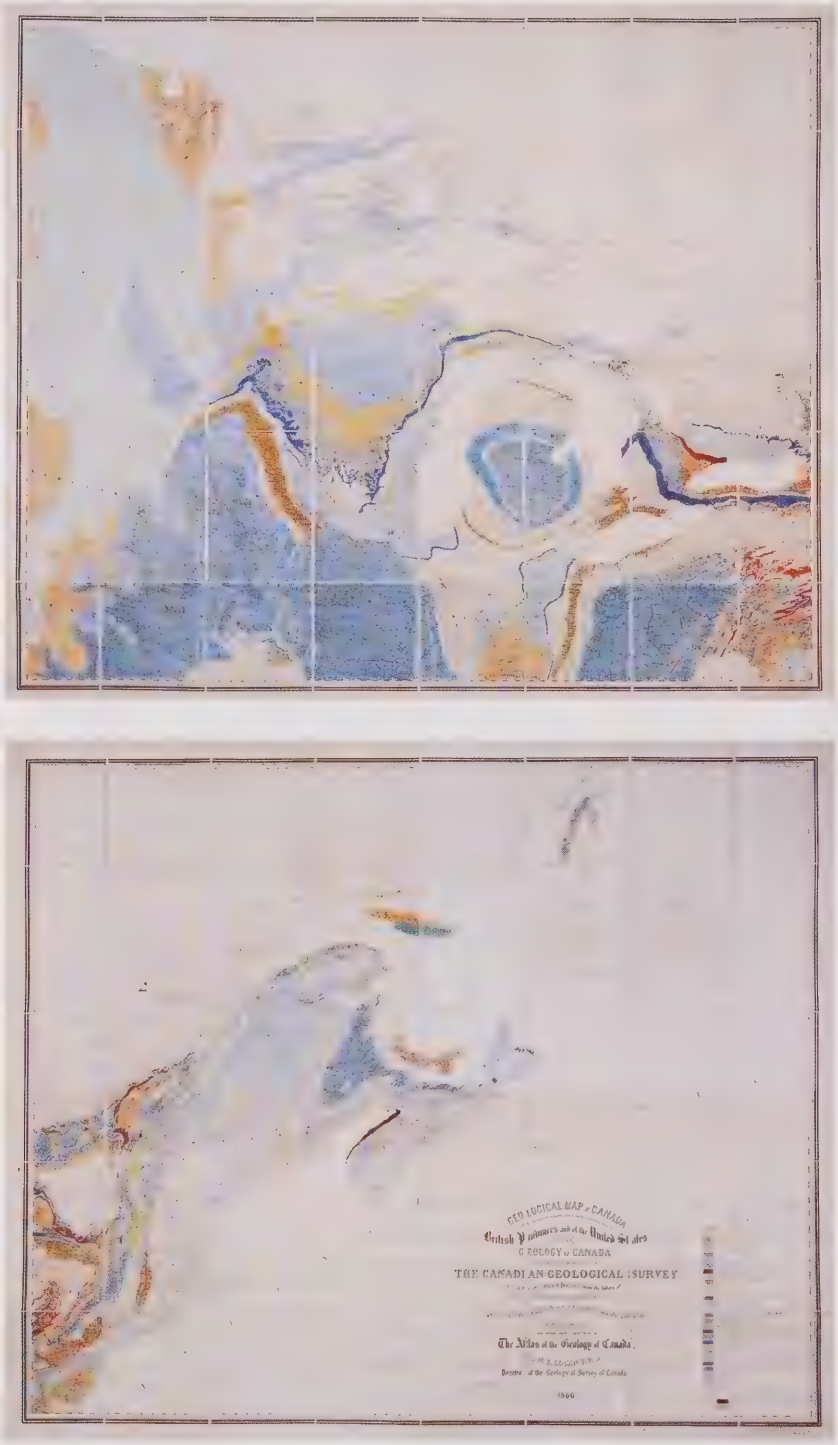
GEOLOGICAL MAP OF CANADA
and the adjacent regions including parts of other
BRITISH PROVINCES and of the UNITED STATES
the Geology of Canada being derived from the results of
THE CANADIAN GEOLOGICAL SURVEY
that of the other British Provinces from the labors of
Dr J.W. Dawson, Prof.r James Robb, J.B. Jukes and others
while that of the United States is compiled under the authority of
Prof. James Hall
from various sources mentioned in the accompanying text.
BY
SIR W.E. LOGAN F.R.S.
Director of the Geological Survey of Canada.
Scale
1864.
EXPLANATION OF THE COLORS
Upper Silurian
Middle Silurian
Lower Silurian
Laurentian
Intrusive

Logan and his colleagues worked at a time when legislators and government committees had yet to understand that geological surveys would become formal ongoing institutions

map of the Province of Canada? By the mid 1850s Logan and his colleagues had been conducting a geological survey of Canada for more than a decade, during a time when legislators and government committees had yet to understand that geological surveys would, by their very nature, become formal ongoing institutions. When, in 1854, Logan faced a select committee appointed to scrutinize the work and the cost of his survey in Toronto, he was well prepared. He had just published his latest map, and there were renowned experts to testify about his remarkable output and its frugal cost. In the end the committee recommended "republication of not less than 20,000 copies of the revised reports, with a coloured map." Logan received clear instructions and the 1855 Act supporting the 1854 recommendation provided $8000.

In April 1855 Logan represented Canada at a second international exhibition, the Paris Exposition, where he again exhibited the original hand-coloured geological map. While in Paris, Logan had the map engraved and, contrary to his biographer Bernard Harrington's view that he abandoned it, the map was published there in French under his name. Again quite small (29.5 cm x 12.2 cm), it is the first of Logan's maps to be printed by chromolithography, a printing process that superseded hand-colouring by the mid 1850s.

The 1855 map's colours are dark and of poor quality, yet in spite of its weaknesses and Logan's dissatisfaction with it this is the first published geological map to focus on the entire Province of Canada. It incorporates the regions shown on his two earlier local maps as well as the Gaspé Peninsula, other parts of the province surveyed by Logan and his staff since 1843,


GEOLOGICAL MAP of CANADA
British Provinces and the United States
GEOLOGY of CANADA
THE CANADIAN GEOLOGICAL SURVEY
The Atlas of the Geology of Canada.
1866

William Logan's large *Geological Map of Canada, British Provinces and the United States*, printed in 1869, but dated 1866, was his supreme achievement. The Royal Ontario Museum is fortunate to own a copy.

and the geology of parts of Nova Scotia, New Brunswick, and Prince Edward Island. There is an increase to 23 geological units assigned to the same six ages shown in 1854, making this map greater in scope and more complex than its predecessors.

Having represented Canada at a second international forum, Logan began to receive many honours, most notably a knighthood in early 1856. Sir William was no doubt pleased to have his work and that of his colleagues recognized. Public recognition did, however, cut into his time for writing and field work. So it is little wonder that his revision of the 1855 map progressed slowly. An additional factor was that although the government committee recommending renewal of the geological survey had suggested the publication of revised reports, Logan was in fact planning and holding out for something more comprehensive. This he achieved in 1863 with the publication of his *magnum opus*, the *Geology of Canada*.

With the completion of this benchmark, Logan was now free to focus on the publication of a properly coloured geological map of Canada. Quite early on he must have decided to produce two maps—a small one at a scale of 125 miles to the inch (approx. 200 km to 2.5 cm) and a large one at a scale of 25 miles to the inch (approx. 40 km to 2.5 cm). Both maps were drawn by Robert Barlow of the geological survey staff. The small map, engraved by A. W. Graham of Montreal, was to have accompanied the *Geology of Canada* in 1863; however, it, and the atlas of which it was part, weren't published until 1865. Logan commented in the preface of the atlas that "various circumstances beyond the control of the Geological Commission ... delayed until now their publication." It seems that he may not have realized the demands that would be placed on him by the new colour printing technology to be used.

In August 1864, Logan went overseas to arrange personally for colour printing of the maps and cross-sections in the atlas. Although he had intended to use a Paris printer, upon arriving in London he found that Stanfords of Charing Cross could do the work. Logan stayed in England for almost nine months, working closely with the printer. After Charles R. Bone, an artist employed by the Geological Survey of Great Britain, had accomplished the difficult task of matching the colours used on British geological maps to the 30 colonial geological units, Logan partially coloured each of 30 copies of the map. By now 66, he complained about London's yellow noon-day fog, the failing autumn light, and his great eye fatigue.

Logan's description of the colouring process suggests that he was probably creating a separate overlay or mask for each of the 30 colours of the map. Each of these 30 separate sheets would then have been transferred to individual stones or zinc

PHOTOGRAPHS COURTESY WILLIAM MORGAN, GEOLOGICAL SURVEY OF CANADA

plates, which would have been used to print the 30 colours in register. Mr. Stanford delivered the first proof copy of the small map at the end of March 1865; it was probably published after Logan left for Canada at the end of May.

Sir Roderick Impey Murchison, who had succeeded de la Beche as director of the Geological Survey of Great Britain, commented favourably on the proof copy. The map, measuring 49.2 cm x 21.5 cm, is far superior in quality and colour to the 1855 version printed in Paris.

Noticeable differences between the 1855 and 1865 maps include the slightly larger size and the increased geographic coverage of the latter. The newer map shows the geology of American states as far south as Kansas, and extends westward to parts of the future Manitoba and eastward to include all of today's Maritime provinces and parts of Newfoundland. Although the western and eastern regions were not yet part of Canada, in Logan's view Canada would, by the addition of various territories, "become a great country hereafter." The 1865 map, still usable nearly 130 years later, shows the distribution of 30 geological units, compared to the 23 documented in 1855. Despite great difficulties he had achieved the coverage, the accuracy, and the resolution that had eluded him a decade earlier.

With the publication of the *Geology of Canada* and the atlas, nobody could have faulted Sir William had he, at age 67, retired. Yet the large geological map of Canada at the scale of 25 miles to the inch was still unpublished. He was keenly aware of the limitations of small geological maps of a large country. Describing his 1865 map he wrote that "from its small size [it] must be regarded chiefly as an index to the larger general map on the scale of 25 miles to the inch." Although the small map was more than an index, Logan knew that the detailed information that he and his colleagues had amassed could only be presented adequately on a larger format.

The large map, an ample 253 cm x 105 cm, was engraved on steel by S. Jacobs and Ramboz of Paris. Logan had received the engraved sheets from Paris while representing Canada at the London International Exhibition of 1862; however, the lettering on the large map was still incomplete two years later. In March 1868 he returned to London to oversee the map's production at Stanfords.

The large geological map of Canada indicates the distribution of 33 geological units in Canada, the adjacent pre-Confederation colonies and territories, and the United States. Thousands of place names, rather than just the minimum necessary, are shown. Political boundaries are more detailed. For example, not only is Manitoba named, but its survey grid is included. Geologically, the map is more precise than the smaller version because the geological units are more accurately related to specific localities. Surprisingly, given the common use of chromolithography by the 1860s, the map was hand-coloured, and the colours are different from previous versions. Was hand-colouring considered more aesthetically pleasing? Did Logan wish to avoid the laborious chromolithographic process, or was it considered too expensive? The answers may never be known. So too, the quantity; to date, only a very few copies are known. Dr. William Morgan, chief scientific editor of the Geological Survey of Canada, to whom I am indebted for gentle criticism and much help on my research on Logan, informed me of the two copies that the GSC possesses. The National Archives has one or more copies, one copy is in private hands, and, of course, there is the copy unearthed from the ROM Archives by Julia Matthews.

By 1868 Logan was 70 years old; he had visited London every year since 1864 and the transatlantic travel and the ever-recurring exhibitions must have wearied him. In 1865, the year two of his brothers died, Logan observed that "warning after warning comes that our own time will arrive at no very distant day." His visit to London in 1868 assured him that his large geological map of Canada would be completed. With its printing in sight, Sir William Logan retired in January 1869, three months short of his 71st birthday.

For the rest of his life, Logan divided his time between Canada and Britain. He died in Wales on 22 June 1875 and was buried in the graveyard of the church of St. Llawddog at Cilgerran in Pembrokeshire. The Royal Ontario Museum is fortunate to own a copy of the large geological map of Canada by this very accomplished man. And after having worked 23 years at the ROM, it is exciting to know that there are discoveries to be made within the Museum's walls that are as thrilling as those in the field. ✿

A photographic portrait of William Logan in later life.

Logan was keenly interested in the concept of a confederation, realizing that with the addition of various territories, Canada would "become a great country hereafter"

DANCING WITH THE ENVIRONMENT

Were medieval irrigation methods more effective than modern ones in Yemen?

ANN WALMSLEY

On hot desert nights, Edward Keall sleeps out on the ramparts of the citadel he is restoring in Zabid, Yemen. Although it is cooler there than inside the building, the curator from the Royal Ontario Museum's West Asian Department cannot get away from a dismal sound: the pounding of diesel pumps extracting water from the aquifers beneath the city—the sound of a resource draining away. For more than 1100 years, Zabid's farms flourished in the arid climate of the Red Sea coastal plain without diesel pumps. They used irrigation canal networks to capture the torrential rainwaters of spring and late summer that charged down from the 2438-metre mountains to the east. The ROM is now unearthing evidence that shows that in Zabid's medieval heyday as an agricultural centre, the population had perfected this delicate dance with the environment. Prudent irrigation methods of that period sustained a population probably larger than Zabid's current 7000 and watered a fertile area of some 3000 square kilometres. While today's residents watch their wells run dry and dig deeper to reach their diminishing water table, those concerned about the city's future cannot help but be curious about the Museum team's findings.

Zabid's predicament today is one that has afflicted other arid regions ranging from Egypt and Ethiopia to Turkmenistan. Farmers attempted to replace centuries-old methods of seasonal farming that use floodwaters with modern year-round farming that use aquifer water. But the advantage of mountain runoff waters is that they deposit nutrient-rich alluvium and rinse salts out of the topsoil. The flow pumped from the water table carries none of those soil nutrients, so farmers must supplement the soil with fertilizers. Furthermore, aquifer water is not applied in sufficient quantity to wash the salts downwards. Instead it evaporates, drawing the salts to the surface. Eventually the soil develops a saline crust and becomes barren. Meanwhile the water table is disappearing. "While the residents of Zabid can now grow plants requiring a lot of water, such as cotton and bananas, in only a few decades Zabid could become an ecological disaster," says Keall.

The ROM Zabid project team hopes to find out when the first attempts were made to harness the spate from the mountains to irrigate fields. It is known from written sources that the city was founded in AD 823 by Baghdad military officers sent to control rebellious tribesmen. Between 1220 and 1450 Zabid reached its zenith as an agricultural economy and harboured a university that attracted mathematicians and Islamic scholars. Then, as now, a broad band of sand dunes separated Zabid from the Red Sea to the west. To the east, an equally frag-

Left: In the arid climate of Yemen, irrigation is the only source of water for the lush vegetation of a banana plantation. This page (inset): The analysis of samples from a deep trench may reveal the kind of vegetation that surrounded what is believed to be a 13th-century villa. Opposite page (inset): Although the central earth barrage was swept away by flooding long ago, impressive stonework still remains from the southern sluice system of the Marib dam.

PHOTOGRAPHY BY ED KEALL

Ann Walmsley is a Toronto journalist

ile environment existed: dry streambeds or "wadis" became filled with water twice a year when the monsoons rose in the Indian Ocean. Because floodwaters tend to seek the path of least resistance by cutting trenches through the alluvial deltas on the plain, Keall suggests that the Wadi Zabid flood would have ranged freely across a wide segment of the countryside. "By nature it's incredibly volatile, but potentially it's enormously rich," he says. "The secret is to control it."

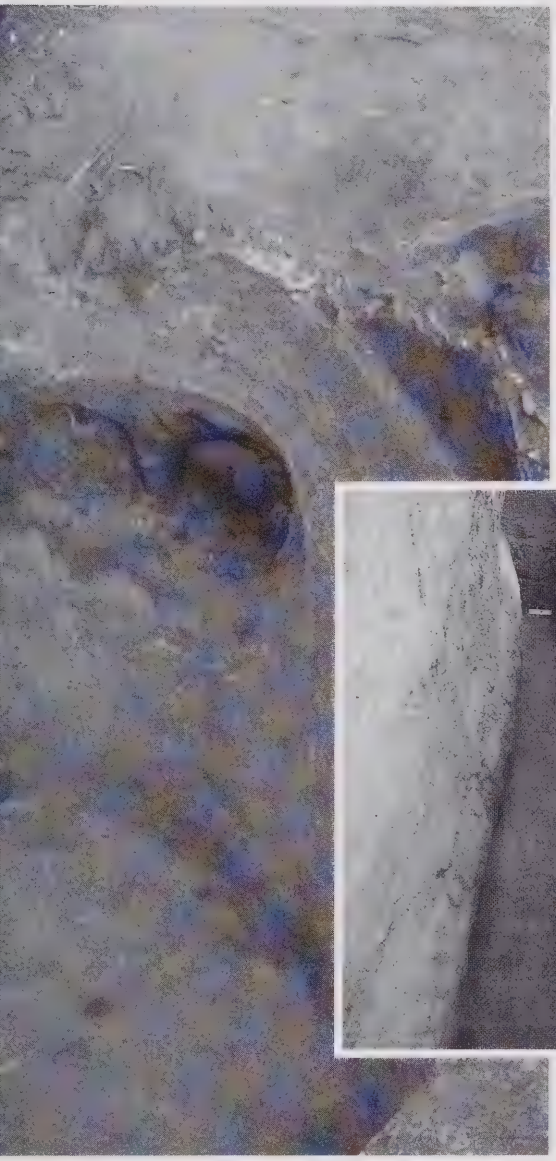
Controlling the wadi would have encouraged population growth. One 13th-century map suggests the city was twice the size it is today, though there is not as yet archaeological proof to substantiate this idea. But Keall wonders whether some of the mosques that lie beyond the perimeter of present-day Zabid and even some of the outlying villages themselves were at one time part of the city. "Mosques are usually set inside the city," he observes.

In piecing together Zabid's irrigation history, Keall is tapping some unconventional archaeological expertise. To analyse the field sediments and pollen, he has brought in Irene Good, an archaeobotanist with experience in Turkey, and Ingrid Hehmeyer, an archaeo-agriculturalist who worked with the German team that surveyed the sophisticated irrigation systems of Marib in eastern Yemen. Hehmeyer will spend the winter of 1993-94 working in the dry gulches of the canal system and hopes to find evidence that irrigation systems actually predated the founding of Zabid. The team is also looking for vestiges of a fabled network of underground pipes described in early texts as delivering

Right: Brickwork exposed by a flood led to the excavation of a water distribution tank. Earthenware pipes lead off from the tank. Opposite page (inset): Researchers determined that this narrow conduit had been rebuilt three times during the period it was in use. Above (inset): Glazed earthenware pipes set in a bed of brick masonry.

year-round water from the mountains to gardens in and around the city. These two systems may together have been the key to the city's success in adapting to the environment for hundreds of years. Says Keall: "The canals fed the fields, while the pipes watered city gardens and served the 200 or so mosques where the faithful performed daily ritual ablutions of hands, faces, and feet."

Hehmeyer's understanding of the ancient irrigation system at Marib is helping the team to interpret the fields around Zabid. Marib, about 200 kilometres east of Zabid on the other side of the mountains, was home to the legendary Queen of Sheba or "Saba." Operational from at least 1000 BC, the Marib system was one of the most remarkable hydraulic engineering feats of antiquity and is even described in the Koran. A nine-metre-high earth barrier wall blocked the path of the seasonal floodwaters from the mountains and redirected the watercourse into cut-stone sluices. They in turn diverted the water into branch canals that led into diked fields. By harnessing and distributing these waters, the Sabaeans were able to create an oasis of some 10,000 hectares (25,000 acres), roughly 10 by 15 kilometres, transforming the desert plain into land capable of sustaining crops of sorghum, millet, and date palms. The money to pay for this elaborate infrastructure came from the region's sovereignty over key trading routes and its own lucrative trade in the aromatic gum resin known as frankincense.



Hehmeyer maintains that there was no direct technology transfer between Marib and Zabid. The Marib diversion barrier, which had over the years been raised to accommodate the buildup of silt against it, finally collapsed in AD 600, 223 years before the founding of Zabid. Unlike the cut-stone construction of Marib, Zabid's system is more rustic and incorporates brick weirs. Yet, the Zabid system is able to irrigate twice the acreage with water from a highland catchment area only half the size of Marib's. One difference is the 200 millimetres of direct rainfall that Zabid enjoys; there is virtually no rainfall in Marib.

Built around 1000 BC, the Marib irrigation system was one of the most remarkable hydraulic engineering feats of antiquity. It is even described in the Koran

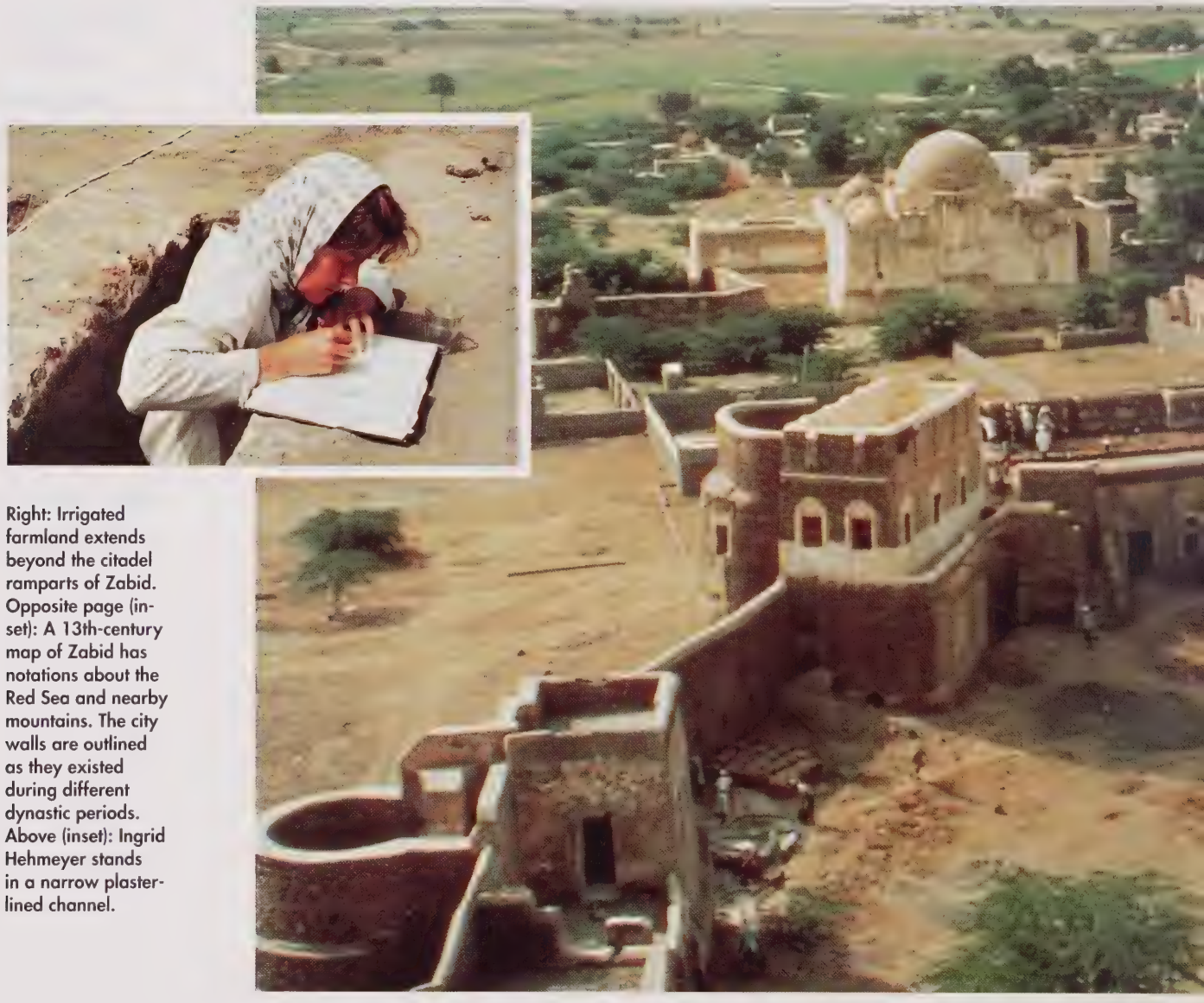
The team's best chance of finding out how far back Zabid used such irrigation techniques would be the discovery of traces of an irrigation system known as ponding. At Marib, fields were banked at the perimeter so that the runoff waters could stand about 60 centimetres deep on the fields, temporarily transforming the fields into ponds. Hehmeyer believes that this type of thorough soaking once a season would store enough moisture in the ground to allow a crop to grow to maturity, even producing a mature seed head.

The Zabid project team has already found layers of sediments along the eroded sides of the Wadi Zabid that appear to be residue from deep ponding as opposed to uncontrolled flooding. The sediments

are visible because floodwaters have washed away part of a field system, exposing a cross-section that can be seen at the side of a stream bed. There is also rubble from cobblestone breakwaters that formed the initial embankments around the fields. "The sediments rose considerably in height in only a few centuries," notes Keall. "In time, as the sediments continued to rise, the original field bank was completely buried beneath the rising alluvium."

"We have also learned quite a bit about the soil itself," says Hehmeyer. "In the beginning we could not tell whether layers were blown in by wind or were silt from irrigation. But we saw the difference when we reopened a trench that we had excavated in 1988 and that had been refilled with wind-blown material. We also learned that floods out of control cut through the irrigation sediments with enormous violence."

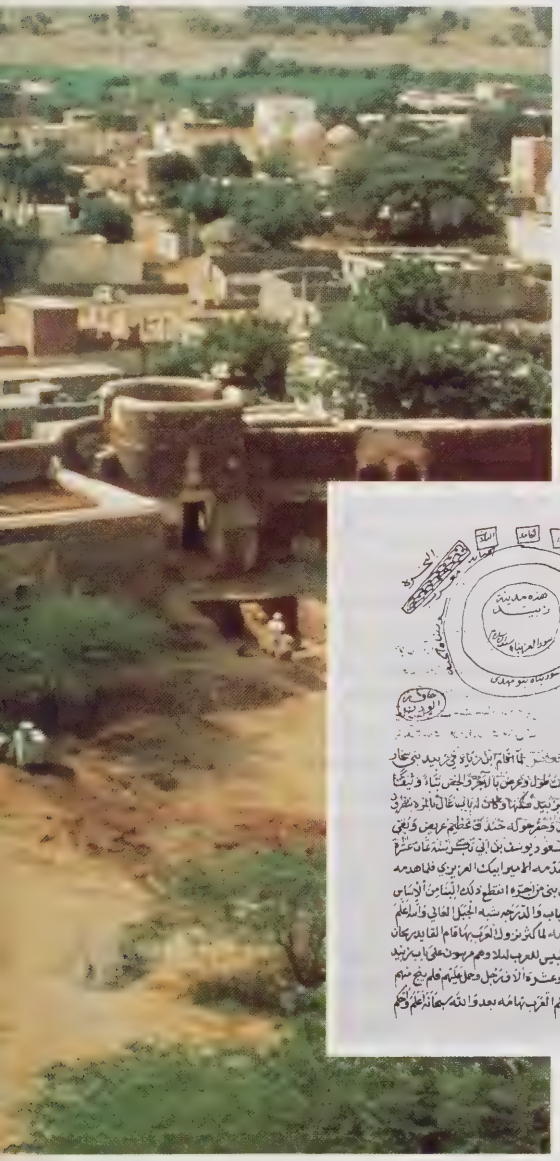
Irene Good has found preserved pollen grains in the sediment soil samples . If the pollen grains are intact, her laboratory analysis should reveal the vegetation on the fields over the centuries and clarify whether certain periods supported only desert plants like thorny acacia while others supported agricultural plants such as sorghum and date palms. "It's complicated because it could be pollen swept up in a thunderstorm and carried from Ethiopia, or it could be from a fruit tree from the other side of the wall," says Keall.



Right: Irrigated farmland extends beyond the citadel ramparts of Zabid. Opposite page (inset): A 13th-century map of Zabid has notations about the Red Sea and nearby mountains. The city walls are outlined as they existed during different dynastic periods. Above (inset): Ingrid Hehmeyer stands in a narrow plaster-lined channel.

The Zabid team's first effort to prove that irrigation had begun before the 9th century was focused on a potter's workshop, which they excavated in 1988 on the outskirts of Zabid. In digging down below the pottery kiln they came to a level com-

posed of many layers of sand and silt containing pieces of bone and pottery. This suggested that they had found evidence of an irrigated field that was later converted to industrial use for the kiln. Red earthenware pottery dates from the 9th century; therefore, the field had to be from an earlier period. To everyone's dismay, it was determined that the layers were actually imported sand and silt for industry. The potter was diverting floodwater and using the silt to make pots ranging from fine clay pitchers to sand-tempered vessels for cooking. "We still have no proof that there was irrigation before the founding of Zabid," concludes Keall. "If there were, it would have been on a modest scale."



But the group has made other discoveries. Since the beginning of the project in 1982, local residents have been asked about the legendary underground water-supply system of Zabid. Quite separate from the wadi canal systems, these conduits were supposed to have irrigated small gardens both outside and inside the city. "Two of the sultans during the Rasulid period (1220-1450) were avid gardeners and wrote agricultural almanacs describing very specifically the sowing, ploughing, and harvesting seasons for various crops," says Keall. "And there is a quote from a 16th-century writer saying that residents preferred drinking well-water to the piped supply." Yemeni folklore also describes a young man, who, hoping to win the hand of a princess, was tricked by the sultan into building an underground conduit from the mountains to the sea. By the time he finished, he was too old and ugly for the princess. "Naturally these stories have some factual basis," observes Keall in a written report. "They were probably invented to explain what otherwise appeared to be an unnatural phenomenon—the kind of engineering project the country no longer had the resources to build or maintain."

Local residents have been asked about the legendary underground water-supply system of Zabid, which was supposed to have irrigated small gardens both outside and inside the city

Despite constant inquiries, no resident could show where such pipes had existed. Then by chance, in 1987, a resident reported that a flash flood in a dry streambed had exposed old brickwork two kilometres east of Zabid. Many times before, Keall and a city official had pursued such leads to no avail. This time, to their amazement, the structure did have the appearance of being very old. Its round shape suggested that it may have been a well. "When I saw the lime mortar, I knew it was old—invariably, whole bricks set in lime are pre-16th century," says Keall.

Delays in gaining a budget and approvals, as well as the intervening Gulf War, postponed archaeological work on the site until January 1992. Excavations finally revealed that it was a circular distribution chamber with a flat entry trough and outlets of glazed pipes. One of the pipes was badly worn and had been repaired with a lead sleeve at the opening. Lime plaster had blocked two other pipes. Possible scenarios came to mind; perhaps

a resident had failed to pay for his water rights. There was enough broken pottery on the bottom of the chamber to conclude that it was in operation well before the 17th century.

While the team laboured on the chamber site, a farmer bulldozing a field just upstream exposed a line of brickwork snaking through a field. It turned out to be a narrow plaster-lined channel of brickwork, more than a metre and a half in depth. "We excavated it to the point where it was too narrow to dig; a workman could not even face forward and shovel," says Keall. "But from the moderate amount of silt in the bottom and the lack of sand, we surmised it was not used for floodwater. It was so narrow that floodwater would have blocked it too quickly." The most important discovery on the site was a potsherd, characteristic of Zabid pottery of the 9th to 10th century, which had been used to fill a gap in the masonry foundation of the channel. Although the structure had been remodelled in later periods, Keall and his team concluded from the pot remnant that the earliest phase of construction was at least the 10th century. "It was a freshly broken pot with crisp edges," says Keall. "It had not bounced around in a streambed for ages. The builder could have broken it the day before. You can imagine that he asked his apprentice to find him a piece of something a certain size for the gap. It is precisely the interchange I have witnessed among our builders doing restoration on the citadel."

Today the pressing question for Zabid is whether the residents are interested in giving up year-round irrigation to return to traditional methods of agriculture

Meanwhile northeast of the city, yet another underground water structure came to light. Construction workers with a backhoe had run into more solid brickwork masonry and the local authorities asked the ROM team to have a look. Suspecting that it was another feature connected with water, Irene Good broke open the masonry and exposed three waterpipes made from interlocking glazed blue-green tile. Like the other exposed brickwork, these pipes contained no significant sediment, suggesting that they may have carried water by gravity from the elevated water table under the mountains. Similar kinds of systems are known as *qanats* in Iran. Corresponding tunnels in the mountains that would have fed this system have yet to be found.

Keall points out that today's observers should not form an entirely rosy view of the environmental practices of medieval Zabid. The abundance of baked-brick structures might also suggest large-scale tree cutting to fire the brick kilns, although over the years, builders plundered abandoned or even buried buildings to recycle their bricks. "According to the tax records, at one point the government was taking higher taxes from the palm trees, so farmers were cutting them down to avoid the levy," notes Keall. And after working from archaeological survey data in the region he is now forming the view that the government at times attempted to overexploit the land.

Today the pressing question for Zabid is whether the residents are interested in giving up year-round irrigation to return to traditional methods of agriculture. The ROM team is leading by example. It has applied for a grant to develop a garden inside the citadel to demonstrate the merits of ponding irrigation. Although the floodwaters no longer reach the citadel, the team plans to use direct rainfall from roof runoff to execute a controlled flooding. Following the sultans' 13th-century almanacs as closely as possible, they will plant sorghum (a corn-like plant), millet (even more drought-resistant), sesame (used for cooking oil), and legumes such as cow pea and hyacinth bean. They will also interplant the legumes with fruit trees including banana, fig, mango, citrus, pomegranate, and date palm. "We hope to have one full ponding inundation a year so that we can point to a mature sorghum plant in February and say 'Look, this was watered with August rain'," says Keall.

Certainly, Hehmeyer warns that Zabid should avoid the route that Marib has taken. After the dam collapsed in AD 600, Marib returned to desert, supporting only a handful of pastoralists with goats and subsistence gardens. Then in 1985 oil sheikhs funded the construction of a dam that created an artificial lake. "Now people are tempted to irrigate twice a week and will have problems with salination," says Hehmeyer.

Keall's other work in Zabid has reinforced the notion that past practices have merit. "We've made an impact by restoring the citadel," he says. "We've demonstrated it's not necessarily backward to preserve the past. If there is an attitude on the part of some of the citizens of Zabid, it is that they should not be aping modernity—that there is merit in traditional technology."

The Sarawak Museum should not be missed by visitors to Borneo

PHOTOGRAPH COURTESY BARBARA STEPHEN

The Sarawak Museum

THOUGH LYING JUST SOUTHEAST OF Singapore, the island of Borneo is still relatively unknown to western tourists. Kalimantan, part of Indonesia, is located in the south of the island, while two Malaysian states, Sarawak and Sabah, and the sultanate of Brunei are in the north. Visitors come to see the spectacular scenery and wildlife, but Borneo is also home to some wonderful museums, in particular the Sarawak Museum in Kuching.

Part of the distinctive character of the Sarawak Museum, and of Sarawak itself, is due to the state's unique history. For more than a hundred years before 1946 Sarawak was ruled as an independent state by an English family. The term "enlightened" is often used to describe the rule of the three Brooke rajahs. One of the most notable aspects of their rule was a demonstrated respect for local indigenous cultures.

During the 19th century the reputation of the Brookes' rule and of the natural wonders of Sarawak attracted some remarkable people to Borneo, among them the naturalist Alfred Russel Wallace, a younger contemporary of Darwin, who independently came up with the same concept of natural selection to explain the evolution of new species. Wallace visited Borneo between 1854 and 1856 and, although encouraged by James Brooke, failed to convince the rajah that he was descended from an orang-utan.

The museum was founded towards the end of the 19th century by the second of the Brooke rajahs, James Brooke's nephew Charles. He began by promoting the collection and donation of natural history specimens to the state. These accumulated in temporary homes until a fine new museum building was opened on 4 August 1891. As reported in the September 1891 *Sarawak Gazette*, H. H. the Rajah's opening address, admirably brief, was given to between three and four hundred assembled guests, including 40 Europeans. He noted that the new museum, decorated for the event with palms and ferns, had "cost a good deal both of trouble and of money but I consider that every Country worthy of being called a Country should have a museum and I hope that ours will be equal, at any rate in time, to that of any other Country in the East, including even India." This original building is still the core of the now modified and extended museum complex.

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during the Second World War, which happily left the museum intact, the third and last English rajah, Vyner Brooke, decided in 1946 to cede Sarawak to the Crown; it remained a British Crown Colony until it joined the new Malaysian confederation in 1963. In the post-war years, activities of the museum were enlivened by its curator, Tom Harrisson, a man of apparently unlimited energy and interests, and a prolific writer. He had first travelled to Borneo as a member of an Oxford University expedition in 1932, from which he returned decorated with some distinctive local tattoos. Later, in 1944-45 during the Japanese occupation, he and three Australians were parachuted into the remote Borneo interior on an intelligence and guerrilla mission. In preparation for this work Harrisson did research in Australia by reading old issues of *The Sarawak Museum Journal*, which had been published between 1911 and 1937. This publication included articles on natural history and ethnographic subjects, which proved invaluable. His appreciation for the Journal was undoubtedly a factor in his reviving it; it still appears annually.

Harrisson's personal work ranged across the Museum's mandate. He could not be an expert in all the fields in which he laboured, and his career brought mixed reviews, but he was astonishingly productive. His writings included such varied topics as the industry of collecting birds' nests, archaeological work in the Niah caves, the influence of outsiders on indigenous peoples, Borneo birds, hairpins, stray antiquities, and hunters' communication with their dogs.

Today, the era of foreign curators behind it, the Sarawak Museum remains a dynamic place. I toured the museum with Dr. Peter Kedit, then director, who is a member of one of the largest indigenous groups, the Iban, and a professional ethnologist. In a developing nation, the museum has become increasingly involved with government initiatives directed at promotion of tourism, and is well aware of the powerful role it has to play in educating both local people and visitors about Sarawak's heritage. In this role the museum worked with the Sarawak Economic Development Corporation to set up the cultural village at Damai Beach a few miles outside Kuching. Here visitors can see typical houses from various parts of Sarawak, in which representatives of the related ethnic groups demonstrate crafts and lifestyle.

Throughout its history the Sarawak Museum has continued to gather collections of natural history, archaeological, ethnographic, and historical materials. It is also charged with a wide variety of responsibilities related to Sarawak heritage preservation, including architectural conservancy and protection of archaeological sites. Even marine turtles are under its care.

The museum has expanded several times in recent years; a new Islamic museum opened in 1992. While the old main building's exhibits, which feature the material culture of Sarawak peoples as well as the region's natural history, retain a comfortably classic air, the new Islamic museum presents elegant, contemporary displays. There are plans for further growth that include some of the historic buildings closer to the riverfront. The first stage of this scheme comprises a textiles museum, which will reflect the rich textile traditions of Sarawak.

Sarawak is still serenely off the beaten tourist track. The capital Kuching is both charming and accessible. Its riverfront area is seemingly little changed since the town was rebuilt in brick following a fire that in 1884 destroyed the old plank buildings. The older buildings associated with the Brooke era are easy to reach on foot. Any visit to Sarawak, however, even if brief, would be better appreciated after a few hours in the Sarawak Museum.

BARBARA STEPHEN
Barbara Stephen is associate curator in charge of the Far Eastern Department, Royal Ontario Museum

ROM Answers

Dear ROM Answers,
We would very much appreciate your help in determining the age of a music box. It is a family heirloom from England, and we know nothing of its origins. The box is made from finely veneered wood, 25.5 cm high, 53.3 cm long, and 30.5 cm deep. The mechanism will play eight different melodies and has the ability to repeat any tune immediately after it has been played once. All you have to do is move a lever to "Repeat." A mechanical pointer indicates the tune being played, and the pointer resets itself after one complete revolution of the drum. Another unusual feature is the set of drums that can be disabled by moving another lever. A similar system exists for the set of bells. Inside the lid there is a piece of cardboard listing the melodies, together with information that is more difficult to understand. A photocopy of the text is attached. Any help that you can give will be very much appreciated.

J. F. C.,
Mississauga, Ontario.

Dear Reader,
Mechanical music boxes were important home entertainment centres and parlour ornaments in the era before record players and radios. Switzerland was the most important producer of the boxes. The label inside the top clearly gives the name of the manufacturer as P. V. F. of St. Croix, Switzerland, and there is a Swiss shield (the opposite of the Red Cross) at the top. The English labelling of the controls indicates that it was made for export to an English-speaking market.

By way of explanation to the queries that you pencilled on the photocopied label, the lettering along the lower edge indicates that the label, which is very artistic in the manner of the times, was drawn and lithographed by J. Bognard, 5, rue de la Perle, Paris. The small round medallions at the top of the label, one with a profile head of Emperor Napoleon III of France, indicate

If you possess furniture, silver, glass, metalwork, ceramics, textiles, or small decorative objects that may have an interesting past and have aroused your curiosity, this column is for you. Send a clear black-and-white photograph (or 35-mm colour slide) of the object against a simple background, providing dimensions, a description, any markings, or any known details of its history to: ROM Answers, c/o Rotunda Magazine, *Royal Ontario Museum, 100 Queen's Park, Toronto, Ontario, M5S 2C6. Be sure to enclose a stamped, self-addressed envelope large enough to include any photos that we must return to you with the reply.*

Neither Rotunda *nor the author nor any other person who may be consulted assumes any legal responsibility for these opinions or their ramifications. No financial appraisals will be offered. If your query is selected to be published in the column, only your initials and city will appear to protect your privacy. Letters will be acknowledged as staff time comes available.*

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that the manufacturer received a prize medal for his music boxes at one of the international expositions held in France during the reign of Napoleon III, either 1855 or 1867. The medallions show both sides of the medal. The central area of the label seems to have been written by hand with a pen. This was necessary because the label was undoubtedly used for a wide variety of models, and to please customers, the repertoire had to be revised frequently to include the latest popular tunes. In the artistic language of the times, the melodies are referred to as "Airs." The notation "*10. pouces. 6923*" probably refers to the size of the brass cylinder. It is 10 inches long and the factory code for this model, much like a fine Swiss watch or a piano, is 6923. It is possible that the box could be dated on the basis of this factory production number, but I do not have access to detailed records that would help with that.

I do not know enough about music to date the box from the repertoire, though it includes a piece from Giuseppe Verdi's opera *La Traviata* (1853), the popular song "Nancy Lee," the gospel song "[In the] Sweet By and By" and pieces by other composers, some still played, others popular only at the time.

Such boxes are very collectable today if they are in good working order like yours. It would probably be a worthwhile idea to have it checked by a qualified appraiser or auction house and evaluated for insurance purposes.

From the tone of your letter, it sounds as if you really enjoy your music box. A similar French music box was donated to the Royal Ontario Museum by the W. Garfield Weston Charitable Foundation in 1975. Mr. Weston truly appreciated vintage music boxes, and several large examples still stand in his fine department store, Fortnum and Mason, in Picadilly, London, England. Thank you for your letter.

PETER KAELLGREN,
EUROPEAN DEPARTMENT,
ROYAL ONTARIO MUSEUM

Dinosaurs, Algonquin Park, the Maya, Gardens, the Amish, and Fort York

WAYNE GRADY'S INFORMATIVE and entertaining book **The Dinosaur Project** (Macfarlane Walter & Ross, $34.95) could scarcely have appeared at a more advantageous moment, when the public's fascination with dinosaurs, never less than a low fever, has suddenly shot way, way up. The book is the story of the ambitious joint effort by Chinese and Canadian palaeontologists to search their own and each other's countries for proof of certain theories about dinosaurs and evolution. Until brought to an abrupt end by strained diplomatic relations following the massacre at Tienanmen Square, the project made a number of interesting discoveries.

Work was done in three different venues, with Chinese scientists coming to the Alberta Badlands and the far north while Canadian ones laboured in the Gobi Desert of Mongolia (which, because of its vastness, remoteness, and barrenness, Grady calls "China's Arctic"). In all three places, the scientists gained important information. They found more evidence to add to the suspicion of recent years that dinosaurs were warm-blooded; they learned much about the migratory patterns that let the dinosaurs spread out with relative evenness over what are now separate continents; and they brought new force to the idea that birds are descendants of small dinosaurs. This last point had been a source of argument for a century.

Grady, who writes with a nice degree of wry understatement at times, does much to inform us about the history not only of dinosaurs but of our perceptions of them (and our misconceptions too). Some of the historical (rather than prehistorical) material is among the most fascinating in the book.

Charles Darwin lamented that proof for some of his views in *Origin of Species* was lacking, "but he blamed it on the scarcity of fossils, not on any weakness in his reasoning." As though on cue, the next generation began stumbling on the missing evidence. In 1873, the geologist George Mercer Dawson found the first Canadian dinosaur bones —an unimpressive accumulation in Saskatchewan—while working for the North American Boundary Commission. One of his assistants, Joseph Burr Tyrrell (the person for whom Alberta's Royal Tyrrell Museum is named) later made a more significant find near what is now Drumheller. "I was climbing up a steep face about 400 feet high," he recalled. "I stuck my head around a point and there was this skull, leering at me, sticking out of the ground." It was the skull of *Dry-tosaurus sarcophagus*, "an early cousin of *Tyrannosaurus rex*."

In succeeding years, a number of pioneering Canadian palaeontologists began working the high coulees and canyons of the forbidding Alberta badlands. It is to the expedition of 1913, for instance, that the core of the ROM's famous collection of dinosaur skeletons owes its origins. As for bone-hunting in the Arctic, like so many other worthwhile initiatives in that part of the world, it was an outgrowth of the search for the lost Franklin expedition.

Of the Dinosaur Project's three venues, northwestern China was by far the most important. It is the only place were fossilized dinosaur bones have been found representing all periods of the Mesozoic era, and indeed during the Dinosaur Project's five seasons, dinosaurs in all main groups were found.

Grady, who accompanied the Canadians to the Gobi and did his share of the dog-labour, discusses some questions which are becoming ever more urgent these days, such as "How far back does cultural appropriation extend?" and "Who owns what?" He also provides some nice bits of descriptive travel writing along the way.

TURNING TO TRAVEL CLOSER TO home, 1993 is the centenary of the creation of Algonquin Park as Ontario's first and still most impressive provincial park, and of course several books have appeared to mark this anniversary—covering such different and very relevant subjects as the park's environment and its place in the history of Canadian art.

Algonquin: The Park and Its People (McClelland & Stewart, $50), with photographs by Donald Standfield and a text by Liz Lundell, reveals that the idea of making that wild and beautifully various place some sort of "national forest or park" goes back to 1885 and Alexander Kirkwood, the chief clerk of Crown lands. Algonquin's attraction for campers and cottagers, of course, has always gone hand-in-hand with its value for loggers—and with ever more controversy as the years have passed. All the major logging companies of the region had licences to exploit parts of Algonquin at one time or another, but the biggest was John Rudolphus Booth, who once employed 6000 men, built his own railway (the Ottawa, Arnprior and Parry Sound) to get the timber to market, and lived to be 99.

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Another fact the readers bring away from this beautiful Standfield-Lundell book (which also has a nostalgic but thoughtful introduction by Roy MacGregor) is the sense that however out-of-the-way it seems even today, Algonquin was once —and comparatively recently—just impossibly remote. The so-called MacDougall Parkway (Highway 60 until renamed to honour a former superintendent of the park) was hacked out in 1936—well within the memory of some of the wonderful old-timers who are interviewed in the course of Lundell's text.

Perhaps the main difference between the Standfield-Lundell book and its rival, **Algonquin** by Roderick MacKay and William Reynolds (Stoddart, $40), is that the latter concentrates more on the flora and fauna, though at no sacrifice to the story of the park's history. MacKay, the author of the text, worked at the park as an interpretative naturalist for several years. He and the photographer, Reynolds, have each published previous books on Algonquin.

A handy book for use when actually travelling is **The Explorer's Guide to Algonquin Park** (Stoddart, $9.95 paper) with text and photographs by Michael W. P. Runtz. The author divides up the terrain logically, suggests a variety of walking tours, and provides a rich fund of information on plant and animal life. The photographs of landmarks are sometimes a little washed-out-looking, but the original maps are clear and useful.

SOME OTHER NEW BOOKS OF INTEREST to Rotunda readers:

• **Lost Kingdoms of the Maya** (National Geographical Society, US $41.95) is by Gene S. and George E. Stuart, a wife-and-husband team of experienced writers on the subject of the magnificent and mysterious Maya culture that flourished for 2000 years, until its contact with Europeans c. 1500. The book neatly summarizes research, especially recent archaeological research (there are now 3500 recorded sites stretching from the Pacific coast of Guatemala to the Caribbean tip of Yucatan). The cities of the southern lowlands were the first to falter, about AD 900, but no one really knows why.

The authors focus on the Maya as builders, on their considerable intellectual and mathematical achievements, on their art works, and on their daily life and social history. They also discuss their living descendants. The writers do not shun controversial topics, from the devastation wreaked by treasure-hunters to guerrilla warfare in Guatemala. Neither do they avert their eyes from what El Norte has done to the Maya inheritance.

Format has a lot to do with a book's accessibility and with the odds on the owner's opening it more than once. *Lost Kingdoms of the Maya* is smaller than most coffee-table books, making it less showy, more tactile, and more readable.

• To judge by the number of societies formed, journals founded, and books published, no area of the artistic past has had quite the boom that the study of gardening history has been enjoying the past few years. Doubtless there are numerous reasons for this trend, including disenchantment with modernist architecture and increasing worry about the environment (for the study of formal gardens of old is where architecture, landscape architecture, ecology, and art history all come together). Amid the deluge of new publications, it's a special pleasure to point out one, **The Planters of the English Landscape Garden: Botany, Trees and the Georgics** (Yale University Press, US $45) by Douglas D. C. Chambers of the University of Toronto English department. Whereas other authors mostly discuss garden design, Chambers is also interested in the philosophy of the garden, and ends up with an appealing and complicated scenario in which the formal English garden, benefitting from new species imported from the North American colonies, becomes a kind

of silent ideological battleground for the Tory and Whig points of views.

Naturally, the most fascinating figure in his book is the famous diarist John Evelyn (1620-1706), an expert on garden design and so many other subjects, who by helping to found the Royal Society allowed new garden ideas to flourish amid the classicism that had characterised the field until then, which in turn led to creation of the Royal Botanical Gardens at Kew.

• In Canada we don't hear much about the Amish, the stand-offish sect of Protestant pacifists who farm with 19th-century technology. But their horse-drawn buggies are a common sight along the lesser highways of Pennsylvania, Ohio, and Indiana. In fact, the whole Amish way of life is a semi-official source of tourism there. How surprising, then, in reading Lucian Niemeyer's photographic study **Old Order Amish: The Enduring Way of Life** (Johns Hopkins University Press, US $39.95) to learn that there is in fact a fairly significant Amish presence in southwestern Ontario—where, partly because it's in the shadows of the Mennonite communities, it's less obvious than it would be otherwise. The text of the book is by Donald B. Kraybill, who is also the editor of a most serious new study, **The Amish and the State** (Johns Hopkins University Press, US $45 cloth, US $14.95 paper). One of his contributors, Dennis L. Thomson, explains that there are about 1850 Amish in this part of the province —out of the total North American population of 128,000. Some are descendants of those who came from Pennsylvania as early as 1824, but most migrated in the 1950s, fleeing nuclear weapons at home and America's greater involvement in Korea.

Thomson makes an interesting comparison of how they have fared under successive Canadian governments—taxation has been just as vexatious for them (and for Ottawa), though differently so than it was in the United States; and the authorities here have yet to test the Amish opposition to conscription—a basic feature of their beliefs.

• An essential new book about Toronto is **Historic Fort York 1793-1993** (Natural Heritage, $29.95 paper) by Carl Benn, the curator of marine and military history at the Toronto Historical Board. It represents a major advance of his smaller 1984 work, *The Battle of York*, for at least a couple of reasons. First, Benn is concerned here with the social and political history of the garrison and its role in the life of the city that eventually surrounded and threatened to destroy it. (The question whether to build the Gardiner Expressway *through* the fort was the 1950s equivalent of the fight against the Spadina Expressway a generation later.) Secondly, Benn has done the most thorough job imaginable in compiling maps, plans, works of art, and archival photos chronicling the fort's inception, decay, and touristy rebirth. Many of these are unpublished elsewhere.

• **Travellers to an Antique Land** by Robert Eisen (Fitzhenry & Whiteside, $38) is about the sweet obsession that has been drawing writers, artists, and other people to Greece for hundreds of years, in search of sunlight, a sense of the classical past, and even (as in Byron's case) military adventure. The book's precise subtitle is "The History and Literature of Travel to Greece," and this is exactly what it is: a sophisticated, thoughtful, and entertaining survey of how the reflected impressions have changed over the centuries to suit the times, from the early antiquaries to one of the great modern writers on Greece, the English poet Peter Levi. Eisen's reading has been amazingly broad, if also less than complete. His bibliography includes Gwendolyn MacEwen, for example, but not Leonard Cohen.

DOUGLAS FETHERLING
Douglas Fetherling is book editor of Rotunda

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Don't Bug Me

CAMOUFLAGE CAN BE A VERY EFFECTIVE MEANS OF DECEIVING and therefore of deterring one's predators. The Malaysian leaf insect, *Phyllium biocellatum*, in the centre of this photo looks like a damaged leaf. Even its eggs, which may take more than a year to hatch, are camouflaged to look like seeds.

A modified stick insect, *Phyllium biocellatum* is vegetarian and, like related species, enjoys only a very limited diet. Because different species can look the same to the human eye, the first clue for entomologists of the presence of more than one species is the insects' food preferences. Insects are first grouped according to what they will eat, and then their DNA is tested to determine genetic similarities and differences.

PHOTOGRAPH BY JOHN MITCHELL

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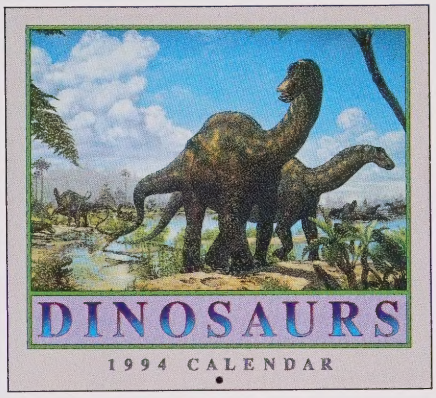

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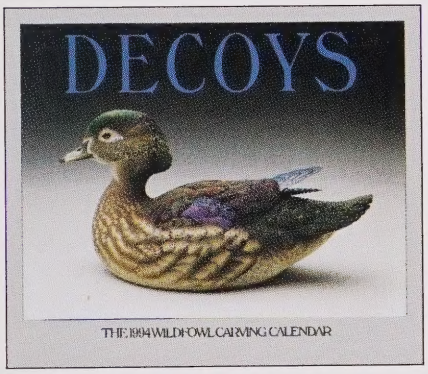

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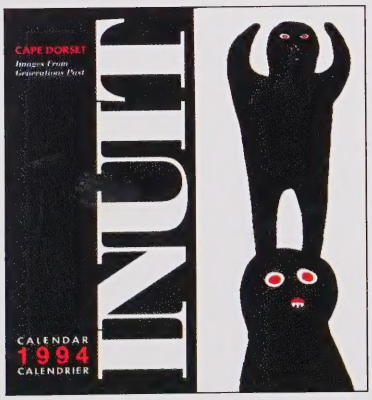

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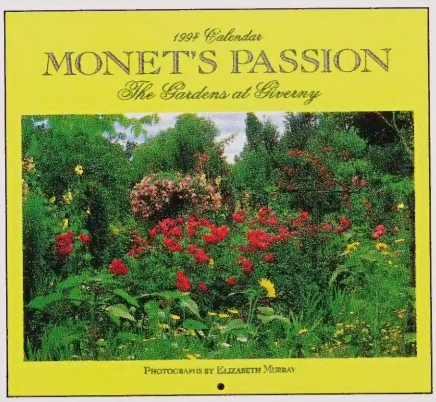

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